

HODDS67	567197	394		blastx.2	[Homo sapiens] (AK001614) unnamed protein product [Homo sapiens]	61393_1 dbj BAA91790.1	100% 100%	69 14	164 67
HODER91	789661	419		HMMER 1.8 blastx.2	PFAM: Zinc finger, C2H2 type (AC007059) Human homolog of Mus musculus wizL protein [AA 4-1561] [Homo sapiens]	PF00096 gb AAD19818.1	11.06 35%	163 1	225 294
HODEX10	926260	423		HMMER 1.8	PFAM: Helicases conserved C-terminal domain	PF00271	9.2	22	54
HODFQ06	934304	451		blastx.2	(AK000496) unnamed protein product [Homo sapiens]	dbj BAA91205.1	48% 60%	466 537	254 454
HODFY16	958329	459		HMMER 1.8	PFAM: Phorbol esters / diacylglycerol binding domain	PF00130	3.15	175	213
HODGC61	973449	463		HMMER 1.8	PFAM: Protein-tyrosine phosphatase	PF00102	6.61	130	222
HODGH02	917969	465		blastx.2	IDN4-GGTR14 PROTEIN.	sp Q9Y6Y5 Q9Y6Y5	94%	17	118
HODGH04	926255	466		blastx.2	IDN4-GGTR14 PROTEIN.	sp Q9Y6Y5 Q9Y6Y5	51%	8	247
HODGI67	974297	471		blastx.14	pol gene protein; Xxx [Homo sapiens]	gi 1196424 gb AAA8 8026.1	70%	132	284
HODGP95	908650	477		HMMER 1.8	PFAM: Zinc finger, C2H2 type	PF00096	18.49	209	271

			blastx.2	(AC005498) R31665_1 [Homo sapiens]	gb AAC32422.1	61% 52% 53% 41% 34% 50% 51% 46% 47% 47% 47% 50% 35% 41%	125 146 146 125 74 146 164 164 307 307 307 310 307 307 307	310 310 292 310 334 307 310 310 357 357 357 357 357 357 357
HODGQ22	974290	479	blastx.2	hypothetical protein Tigger 2 - human transposon MER37 1	pir S72489 S72489	47% 57%	235 287	2 231
HODGQ92	894368	481	HMMER 2.1.1	PFAM: RhoGAP domain	PF00620	30.1	2	- 124
			blastx.2	(AC002398) F25965_3 [Homo sapiens]	gb AAB81198.1	63% 72%	142 2	399 133
HOFAD05	932211	507	blastx.14	unknown [murine herpesvirus 68]	gi 2318003 gb AAB6 6461.1	39% 45% 85%	263 192 120	180 127 100
HOFMB78	572941	512	HMMER 1.8	PFAM: Laminin B (Domain IV)	PF00052	1.62	286	330
			blastx.2	ribosomal protein L7a large subunit [Homo sapiens]	gb AAA60282.1	72% 61% 50%	49 236 44	399 397 91

HOFMF03	924679	516	blastx.2	U88 [Human herpesvirus 6]	emb CAA58337.1	54%	298	116
						49%	298	116
						50%	295	116
						51%	295	116
						54%	298	116
						50%	295	116
						51%	289	116
						55%	298	116
						48%	295	116
						46%	295	116
						52%	298	116
						48%	289	116
						43%	295	116
						51%	295	116
						49%	298	116
						45%	295	116
						43%	295	116
						46%	295	116
						45%	295	116
						54%	297	115
						43%	295	116
						43%	295	116
						45%	295	116
						46%	295	116
						44%	289	116
						44%	289	116
						43%	295	116
						44%	289	116
						46%	289	116
						43%	295	116

HOFMF70	734917	517	HMMER 2.1.1 blastx.2	PFAM: Connexin (AJ004856) connexin31 [Homo sapiens]	PF00029	43%	295	116
HOFMG21	973358	518	HMMER 2.1.1 blastx.14	PFAM: MAS20 protein import receptor mitochondrial outer membrane protein 19 [Homo sapiens]	PF02064	33.6	105	248
HOFMH12	964722	519	blastx.2	19 kDa subunit of NADH:ubiquinone oxidoreductase complex (complex I) [Bos taurus]	emb CAA42218.1 gi 285987 dbj BAA02 804.1	98%	114	416
HOFMH38	920365	520	HMMER 2.1.1 blastx.2	PFAM: TCP-1/cpn60 chaperonin family unnamed protein product [unidentified]	PF00118	104.8	102	287
HOFMI62	796358	523	blastx.2	(AJ388527) Ribosomal protein [Canis familiaris]	emb CAB46829.1	96%	40	228
						93%	60	296
						88%	326	403
						100%	19	69
						100%	286	327
						96%	231	323
						66%	320	355

HOFMJ44	719663	525	HMMER 2.1.1	PFAM: Ribosomal protein S27	PF01667	38%	35	88
			blastx.2	(AF070668) 40S ribosomal protein S27 isoform [Homo sapiens]	gb AAD20974.1	109.1	128	265
HOFMM72	464015	528	blastx.2	(AL117557) hypothetical protein [Homo sapiens]	emb CAB55992.1	95%	56	274
HOFMP79	775242	531	HMMER 2.1.1	PFAM: GrpE	PF01025	65%	61	366
			blastx.2	mt-GrpE#1 precursor [Rattus norvegicus]	gb AAC53534.1	49.4	173	358
HOFMQ65	789347	534	blastx.2	(AL050369) hypothetical protein [Homo sapiens]	emb CAB43677.1	73%	173	400
						86%	36	164
HOFMS89	575820	537	blastx.2	(AF161359) HSPC096 [Homo sapiens]	gb AAF28919.1 AF1 61359_1	68%	113	343
						100%	43	147
						64%	354	404
						53%	181	411
						46%	71	277
						69%	411	488
						72%	48	80
HOFMT43	811542	539	blastx.2	glucosephosphate isomerase [Sus scrofa]	emb CAA82246.1	50%	143	514
						80%	57	161
HOFMT72	563575	541	blastx.2	Huntington Disease (HD) gene exon 1 [Homo sapiens]	emb CAA92991.1	40%	277	501
						82%	52	2
						50%	297	256
HOFMU63	744325	543	blastx.2	(AK000334) unnamed protein product [Homo sapiens]	dbj BAA91091.1	63%	9	245
HOFNA92	792734	547	blastx.2	(AL109701) C15orf3	emb CAB52022.1		151	339
						60%		

				[Homo sapiens]				86%	60	125
HOFNG06	935569	556	blastx.2	(AL133584) hypothetical protein [Homo sapiens]			emb CAB63728.1	37%	128	301
								33%	128	334
HOFNI08	974435	558	blastx.2	(AJ224442) methyltransferase [Homo sapiens]			emb CAA11944.1	90%	80	241
								90%	66	95
								100%	253	270
								81%	25	423
HOFNL18	666498	561	HMMER 1.8	PFAM: Bacterial mutT protein			PF00293	4.34	286	345
HOFNL25	916963	562	HMMER 2.1.1	PFAM: Ribosomal L18ae protein family			PF01775	250.8	62	331
			blastx.2	ribosomal protein L18a - rat			pir S03957 R5RT18	73%	47	514
HOFNL37	906250	563	blastx.2	vimentin [Mus musculus]			dbj BAA19834.1	51%	204	377
								41%	175	396
								100%	140	178
HOFNT59	615305	567	blastx.2	(AB026125) ART-4 [Homo sapiens]			dbj BAA86961.1	59%	146	451
								42%	18	479
HOFNU72	705435	568	blastx.2	(AF086708) 26S proteasome subunit 11 [Homo sapiens]			gb AAC64104.1	94%	46	204
								95%	200	259
								81%	261	308
HOFNW79	973351	570	blastx.2	(AJ388527) Ribosomal protein [Canis familiaris]			emb CAB46829.1	96%	85	273
								100%	276	362
								84%	365	403
								38%	80	133
HOFNY50	715312	572	blastx.2	(AF047704) tuftelin [Mus musculus]			gb AAC04577.1	92%	224	388
								81%	127	222

HOFOB88	751692	579	blastx.2	(AF139185) myomegalin [Rattus norvegicus]		gb AAD29427.1	68%	69	143
HOFOB91	827631	580	blastx.2	nucleobindin [Homo sapiens]		gb AAA36383.1	90%	393	425
HOFOF57	666909	582	blastx.2	T28D6.9 [Caenorhabditis elegans]		emb CAB54316.1	58%	427	477
HOGAF39	947431	584	blastx.14	cyclin A/CDK2- associated p45 [Homo sapiens]		gi 995826 gb AAC50 242.1	80%	13	369
HOGCX95	890607	591	HMMER 1.8	PFAM: Retroviral aspartyl proteases		PF00077	86%	87	233
HOGEE76	968956	592	blastx.14	No definition line found [Caenorhabditis elegans]		gi 1397275 gb AAB0 3138.1	85%	23	43
HOVBY34	706816	602	blastx.2	(AK002129) unnamed protein product [Homo sapiens]		dbj BAA92096.1	43%	141	347
HOVCD39	705406	605	blastx.2	(AF118081) PRO1900 [Homo sapiens]		gb AAF22025.1 AF1 18094 20	57%	347	388
HOVEK70	909138	615	HMMER 2.1.1	PFAM: Zinc finger, C2H2 type		PF00096	47%	78	179
			blastx.2	Bowel [Drosophila melanogaster]		gb AAB17949.1	45%	2	73
							42%	216	257
							32.8	205	504
							36%	650	790
							60%	599	643
							27%	500	586
							80%	177	40
							70%	20	151
							68.7	225	293
							88%	93	377
							35%	111	431
							34%	132	377
							85%	2	82
							32%	81	209

HPDOT03	922481	635	blastx.14	(AF061346) Edp1 protein [Mus musculus]	gi 3114713 gb AAC7 8826.1	33%	368	457
HPDPJ69	966158	637	blastx.14	envelope protein [Homo sapiens]	gi 196425 gb AAA8 8027.1	61%	212	382
HPDRG92	967704	643	blastx.14	2-oxoglutarate dehydrogenase precursor [Homo sapiens]	gi 531241 dbj BAA01 393.1	53%	92	226
						62%	13	108
						82%	7	234
						73%	237	326
						35%	1	60
						75%	279	302
HPEKG18	914115	656	blastx.14	(AB012223) ORF2 [Canis familiaris]	gi 2981631 dbj BAA2 5253.1	75%	96	10
HPFEA08	960372	700	HMMER 1.8	PFAM: HMG (high mobility group) box	PF00505	5.1	68	148
HPIAS40	928614	708	blastx.14	(AF044954) NADH:ubiquinone oxidoreductase PDSW subunit [Homo sapiens]	gi 4164442 gb AAD0 5419.1	96%	68	232
						88%	304	384
						92%	262	303
						53%	384	461
HPIAX11	925424	710	blastx.2	(AL031427) dj167A19.1 (novel protein) [Homo sapiens]	emb CAB46721.1	63%	342	569
						78%	449	604
HPIAZ37	655753	711	HMMER 1.8	PFAM: ATP synthase A chain	PF00119	11.95	68	238
HPIBQ37	884289	712	HMMER 2.1.1	PFAM: Immunoglobulin domain	PF00047	42	149	355
			blastx	(AF111713) junctional adhesion molecule [Homo sapiens]	gb AAD42050.1 AF1 11713_1	100%	89	385
						84%	385	423
HPJCC04	926787	731	blastx.14	(AF159714) PPAR gamma coactivator-1	gi 5802182 gb AAD5 1615.1 AF159714_1	94%	249	40

HPJDA08	958182	741	blastx.14	[Homo sapiens] zinc finger 5 protein [Gallus gallus]	gi 1399185 gb AAB3 8387.1	39%	92	475
HPJET90	836503	750	HMMER 2.1.1	PFAM: Aldehyde dehydrogenase family	PF00171	150.4	66	371
HPMEG50	925080	806	blastx.14	Mst84Dc [Drosophila melanogaster]	gi 11075 emb CAA47 939.1	62% 28% 44%	7 22 126	30 105 152
HPMFL08	959569	819	HMMER 1.8	PFAM: Src homology domain 3	PF00018	4.97	209	238
HPMGF06	954823	845	blastx.14	GTP binding protein [Mus musculus]	gi 53169 emb CAA36 803.1	92%	37	564
HPMGI03	924521	848	blastx.14	(AF106933) plexin B [Drosophila melanogaster]	gi 4056676 gb AAD0 9426.1	36% 60% 63% 43% 66%	49 148 12 288 359	147 177 44 335 385
HPMGX23	575903	864	HMMER 1.8	PFAM: Helix-loop-helix DNA-binding domain	PF00010	6.66	96	194
HPMJF76	965642	875	blastx.14	pol protein [Human endogenous retrovirus K]	gi 1780973 emb CAA 71417.1	58% 40% 63%	234 28 134	326 138 199
HPMJN59	946876	877	HMMER 1.8 blastx.2	PFAM: Prolyl oligopeptidase family (AC005594) R26984_1 [Homo sapiens]	PF00326 gb AAC33801.1	21.87 61%	138 138	251 521
HPMKM81	894416	884	HMMER 2.1.1	PFAM: Homeobox domain	PF00046	82.2	94	228
HPRCC08	939490	901	blastx.14	2.19 [Homo sapiens]	gi 854082 emb CAA6	54%	120	296

HPWAS77	908450	914	HMMER 2.1.1	PFAM: gag gene protein p24 (core nucleocapsid protein)	0645.1 PF00607	92.3	655	266
			blastx.14	gag protein [Human endogenous retrovirus K]	gi 1780975 emb CAA 71418.1	37% 38% 45% 50%	730 185 253 25	248 108 188 2
HSWAC73	710354	926	HMMER 1.8	PFAM: WD domain, G- beta repeats	PF00400	9.99	134	190
HTEAL28	963538	939	blastx.14	(AL080154) hypothetical protein [Homo sapiens]	gi 5262611 emb CAB 45745.1	36%	234	413
HTEBC74	887782	945	HMMER 1.8	PFAM: Armadillo segment protein, repeats	PF00514	20.2	58	183
HTEBY08	960427	954	HMMER 2.1.1	PFAM: Protein phosphatase 2A regulatory subunit PR55	PF01240	92.8	63	251
HTECA21	911369	962	blastx.14	protein phosphatase 2A1 B gamma subunit [Oryctolagus cuniculus]	gi 619215 gb AAA58 956.1	97% 87%	63 231	197 254
			HMMER 2.1.1	PFAM: PDZ domain (Also known as DHR or GLGF).	PF00595	57.6	100	354
HTEDI02	921243	994	blastx.14	tyrosine phosphatase [Homo sapiens]	gi 1486367 emb CAA 56124.1	57% 51%	85 467	351 652
			HMMER 2.1.1	PFAM: Leucine Rich Repeat	PF00560	36.2	346	414
			blastx.14	densin-180 [Rattus norvegicus]	gi 1657758 gb AAC5 2881.1	36% 32%	220 214	450 450

HTEDQ30	530589	1007	HMMER 2.1.1	PFAM: Ferritins	PF00210	34% 30% 33% 26% 29% 36% 36% 24% 26% 40% 29% 29% 31% 29% 24%	220 241 214 214 214 268 463 220 214 463 463 463 463 463 463	456 450 453 441 450 450 612 453 453 588 606 606 606 603 612
HTEDU48	932315	1013	blastx.14	(AF176069) ubiquilin [Homo sapiens]	gi 5733824 gb AAD4 9751.1 AF176069_1	66% 46% 55% 57% 24% 28% 26% 15% 24% 32% 25%	11 305 587 452 251 293 332 311 569 184 329	118 454 688 535 472 388 502 490 679 267 436
HTEDY38	771505	1017	HMMER	PFAM: Zinc-binding	PF00099	2.19	9	44

			1.8	metalloprotease domain				
HTEHY54	922964	1018	blastx.14	lysozyme [Gallus gallus]	gi 63426 emb CAA43319.1	46%	696	457
HTEGM38	675087	1059	HMMER 2.1.1	PFAM: DnaJ domain	PF00226	41%	405	220
HTEGO05	932583	1061	HMMER 2.1.1	PFAM: Eukaryotic protein kinase domain	PF00069	61%	234	181
			blastx.14	male germ cell-associated kinase (mak) [Rattus norvegicus]	gi 205278 gb AAA41562.1	65.2	93	197
HTEHC47	973071	1085	blastx.2	unnamed protein product [unidentified]	emb CAB42447.1	50.8	3	233
HTEHI14	526687	1096	HMMER 2.1.1	PFAM: lactate/malate dehydrogenase	PF00056	85%	3	395
HTEHS19	529280	1113	HMMER 2.1.1	PFAM: 7 transmembrane receptor (Secretin family)	PF00002	64%	489	761
HTEHV72	920610	1117	HMMER 2.1.1	PFAM: IQ calmodulin-binding motif	PF00612	85%	768	848
HTEIB14	963099	1127	HMMER 2.1.1	PFAM: Zinc finger, C2H2 type	PF00096	38%	1023	1100
			blastx.14	Bowel [Drosophila melanogaster]	gi 1388166 gb AAB17949.1	29%	112	612
						50.6	222	371
						19.3	16	135
						41.7	178	240
						53.9	78	146
						90%	9	236
						33%	9	230
						80%	227	316
						33%	9	230
						46%	9	149
						28%	54	230
						31%	230	334

HTEIF40	958355	1128	blastx.14	(AF132972) CGI-38 protein [Homo sapiens]	gi 4680715 gb AAD2 7747.1 AF132972.1	35%	224	316
HTEIK11	967431	1136	blastx.14	Zfp-29 [Mus musculus]	gi 55471 emb CAA38 920.1	28%	188	367
						50%	353	406
						50%	353	406
						50%	353	406
						50%	353	406
						44%	353	406
						61%	368	406
						47%	356	406
						42%	60	137
						38%	353	406
						44%	356	409
						100%	411	431
						85%	411	431
						85%	411	431
						87%	408	431
						100%	414	431
HTEIL07	953803	1139	HMIMER 1.8	PFAM: EF hand	PF00036	11.27	192	263
HTEIP88	941155	1148	HMIMER 2.1.1	PFAM: Transmembrane amino acid transporter protein	PF01490	34.7	1	216
HTEIU92	870652	1154	HMIMER 2.1.1	PFAM: Transketolase	PF00456	70.1	1	225

HTEIV54	922027	1155	blastx.14	p18H-rev 107 [Rattus norvegicus]	gi 433963 emb CAA53991.1	40%	359	682
HTEIY80	955242	1163	blastx.14	(AF146793) protein B [Mus musculus]	gi 4836805 gb AAD30564.1 AF146793_1	65%	251	364
HTEJE15	908360	1170	HMMER 1.8	PFAM: Helicases conserved C-terminal domain	PF00271	91%	320	454
			blastx.14	vasa-like gene protein, RVLG protein=putative DEAD 1 [Rattus sp.]	gi 806464 gb AAB33364.1	74%	453	569
HTEJF45	942476	1172	HMMER 1.8	PFAM: Zinc-binding metalloprotease domain	PF00099	83%	111	203
			blastx.2	(AB017800) nolp [Homo sapiens]	dbj BAA34576.1	31%	257	322
HTEJP10	914785	1180	HMMER 1.8	PFAM: Heat shock hsp90 proteins	PF00183	14.92	5	52
HTEJP66	916481	1181	blastx.14	(AF151885) CGI-127 protein [Homo sapiens]	gi 4929723 gb AAD34122.1 AF151885_1	73%	2	190
HTEKS20	846714	1210	HMMER 2.1.1	PFAM: EF hand	PF00036	84%	242	319
HTELE10	963563	1221	blastx.14	integumentary mucin B.1 [Xenopus laevis]	gi 1184035 emb CAA64795.1	65%	188	265
HTELJ89	966134	1229	HMMER 1.8	PFAM: Zinc-binding metalloprotease domain	PF00099	2.28	593	637
HTELV86	910946	1252	HMMER	PFAM: Fibronectin type	PF00041	69%	135	299
						53%	290	487
						77%	523	549
						37%	540	629
						13.29	110	214
						100%	499	639
						62%	626	706
						84.7	453	539
						75%	339	244
						2.6	290	316
						77.22	400	669

HTEMA54	911666	1260	1.8 - blastx.14	III domain neural cell adhesion protein BIG-2 precursor [Rattus norvegicus]	gi 1016012 gb AAC5 2262.1	96%	1	918
						68%	960	1025
						92%	926	967
						66%	22	75
						28%	1	171
						55%	1	54
						28%	286	399
						42%	10	93
						44%	280	354
						33%	274	390
						33%	286	357
						100%	1028	1054
						42%	184	225
						100%	1057	1077
						28%	658	741
						320.7	247	1161
HTEMK03	923066	1273	blastx.14	(AF116463) unknown [Streptomyces lincolnensis]	gi 4204812 gb AAD1 1530.1	42%	253	849
						44%	955	1161
						55%	1232	1360
						48%	847	927
						58%	1169	1204
						37%	302	216
						53%	171	127
						47%	348	292
						53%	55	17
						35%	231	181
						42%	190	134

HTEMP49	932319	1280	blastx.14	(AL117564) hypothetical protein [Homo sapiens]	gi 5912114 emb CAB55995.1	42% 58%	134 43	78 8
HTEMR65	909280	1281	HMMER 2.1.1 blastx.2	PFAM: Zinc finger, C2H2 type zinc finger protein [Homo sapiens]	PF000096 emb CAA55533.1	91% 51.5%	12 35	629 103
HTEMT06	934338	1284	blastx.14	120 kDa style glycoprotein [Nicotiana glauca]	gi 2653671 gb AAC15893.1	61% 56% 56% 54% 52% 50% 53% 51% 51% 53% 51% 52% 51% 40% 45%	2 2 2 2 2 2 2 2 2 5 2 5 2 909 866	286 286 286 292 286 304 286 286 286 286 283 286 283 998 931
HTEMX92	913795	1288	HMMER 2.1.1 blastx.14	PFAM: BTB/POZ domain (AF086831) leukemia/lymphoma related factor cLRF	PF00651 gi 3599513 gb AAC35368.1	28% 37% 32% 62.3%	50 240 80 122	280 383 226 319
						47% 32%	143 331	337 450

HTENI58	917213	1299	HMMER 2.1.1 blastx.14	[Gallus gallus] PFAM: HMG (high mobility group) box HMG-X protein [Xenopus laevis]	PF00505 gi 639691 dbj BAA06 440.1	118.2	308	514
HTENP54	787535	1306	HMMER 1.8	PFAM: Bacterial regulatory proteins, luxR family	PF00196	6.37	107	199
HTENP80	775387	1307	HMMER 1.8	PFAM: TPR Domain	PF00515	11.77	83	166
HTENR10	963530	1309	blastx.14	protein kinase related to Raf protein kinases; 1	gi 1171248 gb AAC5 0354.1	82%	10	132
HTENR93	920834	1311	blastx.14	(AF121781) unknown [Homo sapiens]	gi 4210989 gb AAD1 2066.1	79% 74%	285 620	644 808
HTENY35	884043	1319	HMMER 1.8	PFAM: Zinc finger; C3HC4 type (RING finger)	PF00097	6.56	449	592
HTEOF80	847224	1327	HMMER 1.8	PFAM: EGF-like domain	PF00008	14.65	20	100
HTEOI36	870575	1330	HMMER 1.8	PFAM: HMG (high - mobility group) box	PF00505	15.44	69	236
HTEON29	815852	1333	HMMER 1.8	PFAM: EF hand	PF00036	22.29	266	349
HTEOV90	870532	1336	HMMER 1.8	PFAM: Core histones H2A, H2B, H3 and H4	PF00125	11.37	358	435
HTEOW39	870566	1338	HMMER 1.8	PFAM: C-type lysozymes and alpha-lactalbumin	PF00062	126.92	59	295

HTEPA08	958391	1340	blastx.14	(AF004430) hD54+ins2 isoform [Homo sapiens]	gi 2895085 gb AAC98478.1	47%	225	482
HTEPE28	932576	1347	HMMER 2.1.1	PFAM: metalloproteinase family M24	PF00557	67%	483	575
			blastx.14	(AC002387) putative methionine aminopeptidase [Arabidopsis thaliana]	gi 2583129 gb AAB82638.1	203	2	442
HTEPM33	870561	1354	HMMER 2.1.1	PFAM: LIM domain containing proteins	PF00412	68%	2	442
HTEPN07	952243	1356	blastx.14	WW domain binding protein-2 [Homo sapiens]	gi 4205086 gb AAD10951.1	51%	408	488
HTEPP30	947107	1359	blastx.14	(AF081947) tektin [Mus musculus]	gi 4235350 gb AAD13183.1	42%	9	158
HTEPV02	917406	1366	HMMER 2.1.1	PFAM: Ank repeat	PF00023	73%	30	689
			blastx.14	alt. ankyrin (variant 2.2) [Homo sapiens]	gi 747710 emb CAA34611.1	21%	72	590
HTEPX32	870698	1367	HMMER 1.8	PFAM: Double-stranded RNA binding motif	PF00035	30.4	343	435
HTEQD40	915198	1371	blastx.14	(AC004877) sco-spondin-mucin-like; similar to P98167 1 sapiens]	gi 3638957 gb AAC36301.1	41%	247	411
						36	508	699
						30%	278	171
						33%	266	195
						43%	188	141
						45%	506	447
						54%	110	78
						42%	121	65
						25%	260	177
HTEQE87	958354	1373	blastx.14	(AF132972) CGI-38 protein [Homo sapiens]	gi 4680715 gb AAD27747.1 AF132972.1	50%	334	645
						58%	149	349

HTEQP45	966141	1379	HMMER 1.8	PFAM: HMG (high mobility group) box	PF00505	5.99	7	48
HTEQR15	939641	1381	HMMER 1.8	PFAM: 4 transmembrane segments integral membrane proteins	PF00335	32.9	174	455
HTEQT63	924799	1383	blastx.2	(AF133424) tetraspanin TM4-B [Homo sapiens]	gb AAAF08363.1 AF1 33424.1	74%	141	698
HTLCA95	911655	1398	HMMER 2.1.1	PFAM: Bacterial mutT protein	PF00293	3.53	472	501
			HMMER 2.1.1	PFAM: Actin	PF00022	345.2	170	1096
			blastx.14	actin 2 [Echinococcus granulosus]	gi 290399 gb AAC80 574.1	50% 42% 53% 45% 63%	170 761 677 593 2	568 1096 760 652 34
HTLCY54	908832	1402	HMMER 2.1.1	PFAM: DnaJ domain	PF00226	119.8	245	445
			blastx.14	(AB014888) MRJ [Homo sapiens]	gi 3402485 dbj BAA3 2209.1	67% 78% 47% 40%	239 797 632 611	616 934 694 691
HTLDE64	908613	1407	HMMER 2.1.1	PFAM: Zinc finger, C2H2 type	PF00096	47.6	197	271
			blastx.2	Kruppel-like factor LKLF [Mus musculus]	gb AAA86728.1	61% 42%	179 57	355 176
HTLDF33	909254	1409	HMMER 2.1.1	PFAM: Zinc finger, C2H2 type	PF00096	80.8	51	119
			blastx.2	(AL022067) dJ134E15.1	emb CAB36862.1	70%	12	422

HTLDG55	911645	1410	blastx.14	(Blimp-1) [Homo sapiens] actin [Trypanosoma brucei]	gi 161963 gb AAA30 151.1	38%	24	392
HTLDO94	915223	1413	blastx.14	(AC004667) hypothetical protein [Arabidopsis thaliana]	gi 3668087 gb AAC6 1819.1	37% 34% 37% 44% 30% 38% 29%	96 108 108 40 37 40 43	263 263 242 93 105 93 93
HTLDS55	891322	1416	HMMER 2.1.1	PFAM: Cell division protein	PF00735	454.7	233	1069
HTLDT05	909752	1417	blastx.2 HMMER 2.1.1	(AJ250723) septin-like protein Sint1 [Mus musculus] PFAM: PH domain	emb CAB59833.1 - PF00169	63% 36.9	131 59	1054 271
HTLDU05	911649	1419	blastx.2 HMMER 1.8	(AK000004) FLJ00004 protein [Homo sapiens] PFAM: Actins	dbj BAA92229.1 PF00022	77% 141.45	47 125	487 469
HTLEH30	934287	1429	blastx.14	(AF113908) actin-related protein [Emmericella nidulans] (AF025310) tsk-1 and tsk-2 kinase substrate [Mus musculus]	gi 4731565 gb AAD2 8502.1 AF113908_1 gi 2739052 gb AAC0 3366.1	30% 33% 90% 58% 81%	2 451 205 343 306	469 540 270 429 338
HTLEJ11	973302	1431	HMMER 2.1.1	PFAM: Eukaryotic protein kinase domain	PF00069	55.9	44	223

HTLET56	911654	1444	blastx.14	(AF144573) Mx-interacting protein kinase PKM [Mesocricetus auratus]	gi 4868443 gb AAD31319.1 AF144573_1	69% 40% 42% 38%	35 437 293 877	268 592 397 939
			HMMER 1.8	PFAM: Actins	PF00022	262.03	134	703
			blastx.14	actin [Filobasidiella neoformans]	gi 508701 gb AAC49074.1	52% 33% 53% 52%	143 787 721 966	715 963 804 1022
HTLET78	836820	1445	HMMER 2.1.1	PFAM: Proprotein convertase P-domain	PF01483	216.9	38	433
HTLEV95	883332	1448	HMMER 1.8	PFAM: Phorbol esters / diacylglycerol binding domain	PF00130	1.97	172	225
HTLEY11	967309	1451	blastx.14	(AC004877) sco-spondin-mucin-like; similar to P98167 1 sapiens]	gi 3638957 gb AAC36301.1	66%	267	250
HTLFE05	954984	1459	blastx.14	(AJ007798) nuclear protein SA3 [Homo sapiens]	gi 5834580 emb CAB55312.1	86% 65%	12 589	731 924
HTLFI39	953730	1462	blastx.2	(AF053356) ORF4 [Homo sapiens]	gb AAC78801.1	100% 100% 100%	77 3 376	256 77 420
HTLGD25	870136	1465	HMMER 1.8	PFAM: Ubiquitin family	PF00240	83.86	79	324
HTLGM07	952254	1470	HMMER 2.1.1	PFAM: 'Cold-shock' DNA-binding domain	PF00313	70.2	3	158
			blastx.14	(AF096834) germ cell	gi 4837737 gb AAD3	90%	3	323

				specific Y-box binding protein [Homo sapiens]	0662.1	100% 100% 100% 36% 28% 34% 40% 63%	393 549 711 661 637 117 475 487	485 614 761 750 720 203 519 519
HTLGT62	918606	1471	blastx.14	a6(IV) collagen [Homo sapiens]	gi 1850097 dbj BAA0 9791.1	48% 38% 61% 40% 80% 61% 53% 37% 42% 66%	187 379 503 113 232 181 229 196 14 181	261 456 541 178 261 219 273 276 70 207
HTLGX90	870528	1473	HMMER 2.1.1	PFAM: UBX domain	PF00789	20.1	637	846
HTLHC14	908428	1474	HMMER 2.1.1	PFAM: 'Cold-shock'- DNA-binding domain	PF00313	36.8	9	95
			blastx.14	(AF096834) germ cell specific Y-box binding protein [Homo sapiens]	gi 4837737 gb AAD3 0662.1	88% 92% 62% 100% 37% 34% 50%	3 330 424 539 539 397 519	260 443 528 577 625 483 572

HTLHP32	933335	1478	HMMER 1.8	PFAM: RNA recognition motif (aka RRM, RBD, or RNP domain)	PF00076		70%	584	613
							28%	509	634
							23%	342	479
							34%	54	140
							37%	460	531
							30%	256	363
							30%	402	479
							24.08	195	284
HTLHT15	946586	1481	blastx.14	(AL032626) cDNA EST EMBL:D70654 comes from this 1 1 1 yk377b8.3 comes f	gi 3925211 emb CAA 21539.1		43%	1	243
							66%	287	358
							50%	402	455
							58%	235	270
							39%	240	308
HTLHV67	936139	1484	blastx.14	(AF005038) secretory carrier membrane protein [Homo sapiens]	gi 5230678 gb AAB6 2723.2		83%	152	475
							60%	591	749
							96%	465	542
							66%	2	46
HTLHZ10	963475	1486	blastx.14	circumsporozoite protein [Plasmodium vivax]	gi 482882 gb AAC46 499.1		37%	3	137
							35%	3	137
							33%	3	137
							35%	45	137
							45%	128	187
							45%	181	240
							45%	234	293
							40%	128	187
							50%	234	281
							50%	340	387

HTLID36	945891	1488	blastx.2	(AC004410) fos39554_1 [Homo sapiens]			40%	181	240
							40%	128	187
							40%	128	187
							50%	287	334
							50%	287	334
							40%	234	293
							40%	128	187
							40%	181	240
							50%	234	281
							50%	340	387
							40%	287	346
							50%	128	175
							50%	258	293
							50%	205	240
							50%	311	346
							54%	6	275
							71%	292	417
							57%	257	319
HTLIY52	942161	1495	HMMER 1.8	PFAM: Eukaryotic protein kinase domain		gb AAC05601.1	251.19	166	933
			blastx.2	serine/threonine kinase [Mus musculus]		gb AAA99535.1	44%	133	936
HTLJA23	953729	1496	blastx.2	(AF053356) ORF4 [Homo sapiens]		gb AAC78801.1	100%	2	274
							100%	394	438
HTLJC71	922923	1498	HMMER 1.8	PFAM: Src homology domain 3		PF00018	9.14	1152	1340
			blastx.2	(AL133030) hypothetical protein [Homo sapiens]		emb CAB61362.1	94%	3	1355
HTLJD88	953714	1500	blastx.14	(AF025310) tssk-1 and		gi 2739052 gb AAC0	83%	3	206

				tssk-2 kinase substrate [Mus musculus]	3366.1	74% 95% 72% 77% 63% 32% 60%	554 263 516 468 510 260 21	715 391 548 494 542 334 50
HTLJJ75	924755	1501	HMMER 2.1.1 blastx.14	PFAM: Coenzyme A transferase succinyl-CoA:alpha- ketoacid coenzyme A transferase [Sus scrofa]	PF01144 gi 164423 gb AAA31 019.1	317.7	445	813
HTTBJ94	530564	1515	HMMER 2.1.1	PFAM: Protein of unknown function	PF01871	63.2	18	254
HTTCT34	973210	1521	HMMER 2.1.1 blastx.2	PFAM: Divalent cation transporter (AK000480) unnamed protein product [Homo sapiens]	PF01769 dbj BAA91192.1	46.7	93	251
HTTDO19	908937	1532	HMMER 2.1.1 blastx.2	PFAM: Zinc finger, C2H2 type zinc finger protein [Homo sapiens]	PF00096 emb CAA55529.1	89% 96% 58% 42.8	466 105 861 22	972 491 1049 90
						76% 72% 45% 67% 44% 67% 50%	1 1 1 1 1 1 13	129 129 237 129 237 129 234

HTTEU68	967819	1543	blastx.14	glycosyl-phosphatidyl- inositol-anchored protein homolog [Mus musculus]	gi 1098569 gb AAA8 2599.1	63% 36% 71% 90% 36% 36% 57% 50%	125 180 149 161 180 180 180 180	190 287 190 190 287 287 221 227
HTTFM66	950051	1556	blastx.2	(AK001269) unnamed protein product [Homo sapiens]	dbj BAA91592.1	36% 52% 32% 52% 43% 84%	26 536 197 759 377 195	190 649 352 827 424 1124
HTTKP07	911390	1587	HMMER 1.8 blastx.2	PFAM: Src homology domain 3 (AL049683) hypothetical protein [Homo sapiens]	PF00018 emb CAB41255.1	15.82 51% 56% 81%	47 8 292 73	196 289 450 309
HUKAC72	966804	1594	blastx.14	DARPP-32=DOPAMINE AND CAMP- REGULATED PHOSPHOPROTEIN.	sp G545790 G545790			
HUVCQ07	928053	1612	blastx.14	SHB=SRC HOMOLOG 2 PROTEIN.	sp G545100 G545100	44% 52% 6.83	102 6 282	251 68 323
HUVFH03	922064	1639	HMMER 1.8	PFAM: FAD/NAD- binding domain in oxidoreductases	PF00175			

HUVGZ77	909169	1650	HMMER 2.1.1	PFAM: BTB/POZ domain (AB011665) BAZF [Mus musculus]	PF00651	51.2	110	253
			blastx.14		gi 3287501 dbj BAA3 1223.1	94% 87%	47 295	301 366
HUVHC93	908555	1653	HMMER 2.1.1	PFAM: KRAB box	PF01352	152.7	147	335
			blastx.14	ha0946 protein is Kruppel-related. [Homo sapiens]	gi 498152 dbj BAA06 541.1	64% 55%	135 72	362 131
HVCAZ38	969208	1659	blastx.2	(AK000496) unnamed protein product [Homo sapiens]	dbj BAA91205.1	64% 75%	395 151	159 110
HVVVBK72	933167	1668	HMMER 1.8	PFAM: UDP- glucuronosyl and UDP- glucosyl transferases	PF00201	70.01	2	391
HWLHJ68	957834	1671	HMMER 1.8	PFAM: Zinc finger, C2H2 type	PF00096	6.35	216	278
			blastx.14	(AB012265) wizL [Mus musculus]	gi 3551182 dbj BAA3 2790.1	55% 39%	201 101	314 169
HVVBY08	957658	1673	HMMER 2.1.1	PFAM: Sm protein	PF01423	79.4	134	355
			blastx.14	(AC005258) R30783_1 [Homo sapiens]	gi 3289993 gb AAC2 5622.1	97% 100%	185 130	403 195
HUVGP05	930892	1677	blastx.14	(AF091457) zinc finger protein RIN ZF [Rattus norvegicus]	gi 4557143 gb AAD2 2522.1 AF091457_1	82% 100%	231 217	398 246
HUVFI01	945834	1679	blastx.2	similar to human TRAMP protein. [Homo sapiens]	dbj BAA06540.1	98%	103	1212
HUNAF20	961527	1693	blastx.14	(AF184971) cytokine	gi 6013325 gb AAF01	100%	382	278

HUNAE02	921132	1696	blastx.14	receptor homolog 1 (AF151848) CGI-90 protein. [Homo sapiens]	320.1 AF184971.1			
HUKEP18	957456	1710	HMMER 1.8	PFAM: Trypsin	gi 4929649 gb AAD3 4085.1 AF151848.1	100%	2	94
			blastx.2	(AF100707) testes- specific protein TSP50 [Homo sapiens]	PF00089	82.96	729	361
HUKDG10	968333	1713	blastx.14	F35D2.4 gene product [Caenorhabditis elegans]	gb AAF22500.1 AF1 00707.1	100%	118	588
HTTJN26	869612	1744	blastx.2	cDNA EST yk338f6.5 comes from this gene; cDNA EST EMBL:D75296 comes from this gene [Caenorhabditis elegans]	gi 861294 gb AAA68 328.1 emb CAB04553.1	47% 35% 50%	3 587 666	314 345 589
HTTIR04	926772	1748	blastx.14	(AF092091) cp431 - [Rattus norvegicus]	gi 3851160 gb AAC7 2234.1	45% 26%	462 195	163 118
HTTDM42	460948	1762	HMMER 2.1.1	PFAM: KRAB box	PF01352	79.1	282	401
HTTBP62	932997	1771	blastx.14	(AF036705) Similar to phytoene desaturase; coded for 1 1 1 coded for	gi 2749982 gb AAB9 5172.1	69% 68%	64 373	336 468
HTLHK57	946914	2662	blastx.14	acetylcholine receptor alpha 9 subunit [Rattus rattus]	gi 595481 gb AAA56 720.1	76% 71%	783 586	938 720
HTLHB93	945862	1797	blastx.2	(AJ006692) ultra high sulfur keratin [Homo sapiens]	emb CAA07188.1	40% 39%	21 21	272 272

HTLGS10	963458	1799	blastx.14	pro-alpha-2(I) collagen [Mus musculus]	gi 50489 emb CAA41 205.1	34% 50% 26% 53%	108 380 186 302	212 433 320 340
HTLEQ92	932882	1804	blastx.14	(AL117444) hypothetical protein [Homo sapiens]	gi 5911890 emb CAB 55929.1	100% 100% 36%	6 203 213	107 256 269
HTLEN77	772363	1806	HMMER 1.8	PFAM: EF hand	PF00036	26.93	294	380
HTLDZ81	778180	1810	HMMER 1.8	PFAM: Tubulin	PF00091	12.29	156	245
HTLDW27	961353	1811	blastx.14	(AF014461) EXO70 protein [Mus musculus]	gi 2352998 gb AAB6 9345.1	95% 100% 88% 76% 63%	239 186 76 1 36	601- 236 126 51 68
HTLBH67	751985	1821	HMMER 1.8	PFAM: Src homology domain 3	PF00018	37.78	16	162
HTFBE02	920507	1830	HMMER 2.1.1	PFAM: Isopentenyl- diphosphate delta- isomerase	PF01772	95.6	103	291
HTEQN83	908528	1834	HMMER 2.1.1	PFAM: KRAB box	PF01352	98.7	81	203
			blastx.14	(AL080125) hypothetical protein [Homo sapiens]	gi 5262560 emb CAB 45723.1	62% 66%	75 39	251 74
HTEPE35	948475	1838	HMMER 2.1.1	PFAM: Phosphatidylinositol- specific phospholipase C, Y domain	PF00387	163.8	839	507

				blastx.2	1-phosphatidylinositol-4,5-bisphosphate phosphodiesterase 1	pir S14113 S14113	48%	1	750
HTEOY82	948845	1839		blastx.14	(AJ010949) calcium channel alpha-2-delta-C subunit [Mus musculus]	gi 4186073 emb CAA09423.1	97%	165	374
HTEMV66	813038	1852		HMMER 2.1.1	PFAM: Eukaryotic protein kinase domain	PF000069	27.8	154	315
HTEMU66	944419	1853		HMMER 1.8	PFAM: Eukaryotic protein kinase domain	PF000069	114.85	613	963
				blastx.2	MEK Kinase 3 [Mus musculus]	gb AAB03535.1	49%	604	948
HTEMO58	964769	1855		blastx.14	casein kinase 1 gamma 1 isoform [Rattus norvegicus]	gi 854733 gb AAC52200.1	82%	395	195
							65%	482	423
							87%	424	401
							77%	214	188
HTEKH17	942526	1867		blastx.2	(AF016184) putative pheromone receptor [Rattus norvegicus]	gb AAC53331.1	70%	300	88
							53%	602	378
							52%	85	29
HTEGJ74	765901	1892		HMMER 2.1.1	PFAM: Tudor domain	PF00567	38.5	6	167
HTEHD90	909165	1924		HMMER 2.1.1	PFAM: BTB/POZ domain	PF00651	38.1	195	308
				blastx.14	(AF097916) HIV-1 inducer of short transcripts binding protein [Homo sapiens]	gi 3860089 gb AAC72973.1	45%	150	308
							39%	348	416
HTEHD42	615250	1926		HMMER 2.1.1	PFAM: ADP-ribosylation factor family	PF00025	156.4	42	353

HTEDF22	908406	1935	HMMER 1.8 blastx.2	PFAM: Zinc finger, CCHC class nucleic acid binding protein [Mus sp.]	PF00098	20.37	250	297
HTECC09	678659	1952	HMMER 1.8 blastx.2	PFAM: Zinc finger, C3HC4 type (RING finger) (AF151048) HSPC214 [Homo sapiens]	gb AAA89198.1 PF00097	46% 14.18	52 261	303 338
HPWTA06	936026	1982	HMMER 1.8 blastx.14	Collagenase precursor (EC 3.4.-.-) [Escherichia coli]	gb AAF36134.1 AF1 51048.1	85%	111	332
HPWSA52	727294	1983	HMMER 1.8	PFAM: Homeobox domain	gi 1742347 dbj BAA1 5068.1	100% 100% 100% 58% 64%	624 359 457 216 169	454 207 362 115 86
HPWAJ39	575271	1993	HMMER 1.8	PFAM: Phorbol esters / diacylglycerol binding domain	PF00130	2.68	81	122
HPRAG45	939849	2672	HMMER 1.8	PFAM: WD domain, G- beta repeats	PF00400	21.65	135	212
HPMGR15	660374	2040	HMMER 1.8	PFAM: Phorbol esters / diacylglycerol binding domain	PF00130	2.84	307	333
HPLAI10	968707	2074	blastx.14	AT motif-binding factor [Mus musculus]	gi 1345408 dbj BAA0 5046.1	33%	443	496
HPJEV95	929723	2076	HMMER 1.8	PFAM: ATP synthase A chain	PF00119	20.61	169	393
HPJDT03	922815	2083	HMMER	PFAM: WW/rsp5/WWP	PF00397	9.71	294	371

HPJDA25	951281	2087	1.8	blastx.2	domain containing proteins (AF047690) ATP-binding cassette protein M-ABC1 [Homo sapiens]	gb AAD15748.1	73%	291	488
HPJDA25	951284	2676	blastx.14		(AF047690) ATP-binding cassette protein M-ABC1 [Homo sapiens]	gi 4321407 gb AAD1 5748.1	87%	219	97
HPJQA70	973604	2130	HMMER 1.8		PFAM: Flagella basal body rod proteins	PF00460	41.51	206	298
			blastx.14		Flagellar hook-associated protein 1 (hap1) . [Escherichia coli]	gi 1651528 dbj BAA3 5891.1	77% 100%	322 194	498 322
HPCTD03	922149	2191	HMMER 2.1.1		PFAM: Pterin 4 alpha carbinolamine dehydratase	PF01329	143.1	6	305
			blastx.14		pterin-4a-carbinolamine dehydratase [Homo sapiens]	gi 848985 gb AAA69 662.1	62%	18	311
HPCOV68	911075	2195	blastx.14		(AC004500) GDF-9 [Homo sapiens]	gi 2996640 gb AAC0 8450.1	64%	2	160
HPCAO89	946913	2196	HMMER 1.8		PFAM: Serpins (serine protease inhibitors)	PF00079	53.12	94	309
			blastx.2		leupin [Homo sapiens]	emb CAA61420.1	39% 45%	82 309	327 452
HOVEE20	909030	2207	HMMER 2.1.1		PFAM: KRAB box	PF01352	105.4	229	348
			blastx.14		zinc finger protein 30 [Mus musculus]	gi 456269 emb CAA8 2913.1	67% 33%	193 367	348 429

HOVCO50	932544	2211	HMMER 1.8 blastx.14	domesticus] PFAM: Zinc-binding metalloprotease domain (AF072860) protein activator of the 1	PF00099 gi 3290198 gb AAC2 5672.1	2.22	464	508
HOOKF04	925784	2244	blastx.14	(AF092091) cp431 [Rattus norvegicus]	gi 3851160 gb AAC7 2234.1	82% 43% 94% 94% 29% 27%	458 204 2 158 5 5	577 251 157 265 127 115
HOOJN04	925783	2246	blastx.14	(AF011336) putative E1- E2 ATPase [Mus musculus]	gi 2944187 gb AAC0 5245.1	100%	4	153
HONAD02	859016	2261	HMMER 2.1.1	PFAM: Polyprenyl synthetases	PF00348	38.5	753	905
HOGAM56	908904	2276	blastx.14	ZINC FINGER [CLONE ZNF78L1].	sp G299838 G299838	63% 68% 56% 50% 46%	6 3 33 188 191	179 152 176 235 235
HOFNW65	815822	2286	HMMER 2.1.1	PFAM: Calpain family cysteine protease	PF00648	34.2	18	89
HOFNW07	953436	2288	HMMER 2.1.1 blastx.14	PFAM: Cytochrome c/c1 heme lyase holocytochrome c-type synthetase [Homo sapiens]	PF01265 gi 1209635 gb AABI 9007.1	21.1 71% 83%	259 190 139	354 360 192
HOFNI10	964682	2301	blastx.14	similar to Human zinc- finger protein, BR140(P1:JC2069)	gi 1504012 dbj BAA1 3205.1	100% 90% 100%	150 64 271	269 153 291

[illegible]

HOF25	942367	2320	blastx.2	sapiens]	264.1]	50%	55	429
				(AF036696) contains similarity to Brassica oleracea non-green 1 (GB:U13632) [Caenorhabditis elegans]	gb AAB88349.1	50%	25	402
HODFF88	974911	2341	HMMER 1.8	PFAM: Eukaryotic protein kinase domain	PF00069	44%	79	429
			blastx.14	mixed-lineage protein kinase 1 - human	pir S32467 JU0229	28%	4	66
HODFD73	909812	2343	HMMER 2.1.1	PFAM: GTPase-activator protein for Ras-like GTPase	PF00616	39%	289	969
			blastx.14	(AB016962) synGAP-b1 [Rattus norvegicus]	gi 4417207 dbj BAA74972.1	101.43	98	370
HODCZ64	745966	2357	blastx.2	elastin like protein [Drosophila melanogaster]	emb CAA59990.1	74%	131	493
						81%	763	921
HODAK55	745532	2383	HMMER 1.8	PFAM: ATPases associated with various cellular activities (AAA)	PF00004	30%	751	915
						34	190	390
HOCPH02	917453	2400	HMMER 1.8	PFAM: Zinc finger, C3HC4 type (RING finger)	PF00097	98%	4	480
						75%	3	86
HNIAB26	974750	2412	blastx.14	PR-1-like protein	gi 166861 gb AAA32	42%	364	405
						42%	358	399
						60.69	11	157
						8.27	265	309
						37%	388	143

HLWFB01	915399	2419	blastx.14	[Arabidopsis thaliana] (AL117637) hypothetical protein [Homo sapiens]	863.1 gi 5912226 emb CAB 56026.1	94%	155	328
HLWBC21	869611	2443	HMMER 1.8	PFAM: Src homology domain 3	PF00018	3.29	350	379
HLWBA27	931387	2445	blastx.14	(AF070657) glutathione S-transferase subunit 13 homolog [Homo sapiens]	gi 4454690 gb AAD2 0963.1	93% 75% 100%	89 486 277	286 533 306
HLWAW86	941397	2692	HMMER 1.8	PFAM: Integrins alpha chain	PF00357	163.29	115	459
HLWAR08	959139	2448	HMMER 1.8	PFAM: Ank repeat	PF00023	13.97	3	44
HLWAL31	971312	2693	HMMER 2.1.1 blastx.2	PFAM: Leucine rich repeat C-terminal domain (AF133270) SLIT2 [Homo sapiens]	PF01463 gb AAD25539.1 AF1 33270_1	51.7	317	466
HJMAU07	961623	2466	blastx.14	(AB016088) RNA binding protein [Homo sapiens]	gi 5821145 dbj BAA8 3714.1	89% 37% 35% 30% 72% 57%	77 77 92 92 495 493	565 481 505 553 524 534
HETLF29	909762	2471	HMMER 1.8 blastx.14	PFAM: Eukaryotic protein kinase domain similar to cAMP- dependant protein kinase; cDNA EST 111	PF00069 gi 3878636 emb CAA 88953.1	143.18 56%	6 6	416 416
HETBE61	965638	2483	blastx.14	(AF151833) CGI-75 protein [Homo sapiens]	gi 4929619 gb AAD3 4070.1 AF151833_1	88% 77%	347 247	526 339

HEQCC01	924849	2488	blastx.14	(AF151878) CGI-120 protein [Homo sapiens]	gi 4929709 gb AAD34115.1 AF151878.1	93%	318	365
HEQBG85	827915	2492	HMMER 1.8	PFAM: Peroxidases	PF00141	81%	215	262
HEQAD73	914044	2500	blastx.14	(AL023286) hypothetical protein [Schizosaccharomyces pombe]	gi 3116115 emb CAA18866.1	73%	892	422
HEPCB04	941270	2502	blastx.14	(AF153605) androgen induced protein [Homo sapiens]	gi 5231135 gb AAD41087.1 AF153605.1	69%	343	266
HEPAJ04	933091	2513	blastx.14	(AL034368) predicted using hexExon; L779.3; 1	gi 4760337 emb CAB39078.2	24.44	13	162
HEGBC03	922550	2516	blastx.14	similar to collagen [Caenorhabditis elegans]	gi 3873667 emb CAA94874.1	38%	319	444
HEEAX09	912065	2525	HMMER 1.8	PFAM: lipocalins	PF00061	39%	463	546
HEEAG51	930810	2533	blastx.14	epididymal secretory protein I (ESP I) [Rattus norvegicus]	gi 56117 emb CAA42493.1	70%	203	232
HCOMM05	925952	2554	HMMER 1.8	(AF083108) sirutin type 3 [Homo sapiens]	gi 5225322 gb AAD40851.1 AF083108.1	97%	524	387
				PFAM: Src homology domain 3	PF00018	44%	95	148
						87%	302	325
						50%	201	236
						50%	1	42
						45%	230	262
						57%	252	293
						66%	229	255
						12.2	86	205
						39%	86	208
						39%	8	76
						33%	206	259
						82%	94	282
						75%	260	295
						59.48	178	342

HCHOX63	957690	2556	blastx.14	epidermal growth factor receptor kinase substrate [Homo sapiens]	gb AAA62280.1	46%	445	840
						43%	115	435
						23%	43	222
HCHNW48	862478	2557	HMMER 1.8	CDC42 GTPase- activating protein [Homo sapiens]	gi 409027 gb AAA16 142.1	64%	112	597
						78%	661	702
HCHMW18	966985	2559	blastx.14	PFAM: Laminin B (Domain IV)	PF00052	1.52	230	289
				(AB017614) OASIS protein [Mus musculus]	gi 4519621 db BAA7 5670.1	100%	538	386
						68%	440	222
						39%	308	240
HCHMI15	935298	2562	blastx.14	PSD-95/SAP90-associated protein-4 [Rattus norvegicus]	gi 1864093 gb AAB4 8590.1	52%	181	582
						75%	682	825
						91%	584	691
						50%	620	667
HCHAI62	743411	2570	HMMER 1.8	PFAM: Core histones H2A, H2B, H3 and H4	PF00125	8.45	2	76
HCDMC22	672815	2578	HMMER 1.8	PFAM: Core histones H2A, H2B, H3 and H4	PF00125	9.49	182	241
HBGTT76	903653	2619	HMMER 2.1.1	PFAM: Ank repeat	PF00023	62.3	197	295
				(AJ133120) Proline rich synapse associated protein 2 [Rattus norvegicus]	gi 5262748 emb CAB 45688.1	72%	131	556
						47%	499	561
HBGMT82	954374	2624	blastx.14	(AJ004801) very large virion protein (tegument) [Bovine herpesvirus type 1.1]	gi 2653311 emb CAA 06097.1	37%	187	267
						35%	91	201
						32%	91	201
HBGDF39	861602	2631	HMMER	PFAM: Response	PF00072	44.82	158	355

HBCPV80	932817	2639	1.8 HMMER 2.1.1.	regulator receiver domain PFAM: WW domain	PF00397	64.2	71	160
HAQCD07	958959	2649	blastx.14	(AC005581) R31237_1, partial CDS [Homo sapiens]	gi 3510234 gb AAC3 3487.1	100%	1	108

[075] Table 2 further characterizes certain encoded polypeptides of the invention, by providing the results of comparisons to protein and protein family databases. The first column provides a unique clone identifier, "Clone ID NO.:", corresponding to a cDNA clone disclosed in Table 1A. The second column provides the unique contig identifier, "Contig ID:" which allows correlation with the information in Table 1A. The third column provides the sequence identifier, "SEQ ID NO:X", for the contig polynucleotide sequences. The fourth column provides the analysis method by which the homology/identity disclosed in the row was determined. The fifth column provides a description of PFam/NR hits having significant matches identified by each analysis. Column six provides the accession number of the PFam/NR hit disclosed in the fifth column. Column seven, "Score/Percent Identity", provides a quality score or the percent identity, of the hit disclosed in column five. Comparisons were made between polypeptides encoded by polynucleotides of the invention and a non-redundant protein database (herein referred to as "NR"), or a database of protein families (herein referred to as "PFam"), as described below.

[076] The NR database, which comprises the NBRF PIR database, the NCBI GenPept database, and the SIB SwissProt and TrEMBL databases, was made non-redundant using the computer program nrdb2 (Warren Gish, Washington University in Saint Louis). Each of the polynucleotides shown in Table 1A, column 3 (e.g., SEQ ID NO:X or the 'Query' sequence) was used to search against the NR database. The computer program BLASTX was used to compare a 6-frame translation of the Query sequence to the NR database (for information about the BLASTX algorithm please see Altschul et al., J. Mol. Biol. 215:403-410 (1990), and Gish et al., Nat. Genet. 3:266-272 (1993)). A description of the sequence that is most similar to the Query sequence (the highest scoring 'Subject') is shown in column five of Table 2 and the database accession number for that sequence is provided in column six. The highest scoring 'Subject' is reported in Table 2 if (a) the estimated probability that the match occurred by chance alone is less than $1.0e-07$, and (b) the match was not to a known repetitive element. BLASTX returns alignments of short polypeptide segments of the Query and Subject sequences which share a high degree of similarity; these segments are known as High-Scoring Segment Pairs or HSPs. Table 2 reports the degree of similarity

between the Query and the Subject for each HSP as a percent identity in Column 7. The percent identity is determined by dividing the number of exact matches between the two aligned sequences in the HSP, dividing by the number of Query amino acids in the HSP and multiplying by 100. The polynucleotides of SEQ ID NO:X which encode the polypeptide sequence that generates an HSP are delineated by columns 8 and 9 of Table 2.

[077] The PFam database, PFam version 5.2, (Sonnhammer et al., Nucl. Acids Res., 26:320-322, (1998)) consists of a series of multiple sequence alignments; one alignment for each protein family. Each multiple sequence alignment is converted into a probability model called a Hidden Markov Model, or HMM, that represents the position-specific variation among the sequences that make up the multiple sequence alignment (see, e.g., R. Durbin et al., *Biological sequence analysis: probabilistic models of proteins and nucleic acids*, Cambridge University Press, 1998 for the theory of HMMs). The program HMMER version 1.8 (Sean Eddy, Washington University in Saint Louis) was used to compare the predicted protein sequence for each Query sequence (SEQ ID NO:Y in Table 1A) to each of the HMMs derived from PFam version 5.2. A HMM derived from PFam version 5.2 was said to be a significant match to a polypeptide of the invention if the score returned by HMMER 1.8 was greater than 0.8 times the HMMER 1.8 score obtained with the most distantly related known member of that protein family. The description of the PFam family which shares a significant match with a polypeptide of the invention is listed in column 5 of Table 2, and the database accession number of the PFam hit is provided in column 6. Column 7 provides the score returned by HMMER version 1.8 for the alignment. Columns 8 and 9 delineate the polynucleotides of SEQ ID NO:X which encode the polypeptide sequence which shows a significant match to a PFam protein family.

[078] As mentioned, columns 8 and 9 in Table 2, "NT From" and "NT To", delineate the polynucleotides of "SEQ ID NO:X" that encode a polypeptide having a significant match to the PFam/NR database as disclosed in the fifth column of Table 2. In one embodiment, the invention provides a protein comprising, or alternatively consisting of, a polypeptide encoded by the polynucleotides of SEQ ID NO:X delineated in columns 8 and 9 of Table 2. Also provided are polynucleotides encoding such proteins, and the complementary strand thereto.

[079] The nucleotide sequence SEQ ID NO:X and the translated SEQ ID NO:Y are sufficiently accurate and otherwise suitable for a variety of uses well known in the art and described further below. For instance, the nucleotide sequences of SEQ ID NO:X are useful for designing nucleic acid hybridization probes that will detect nucleic acid sequences contained in SEQ ID NO:X or the cDNA contained in Clone ID NO:Z. These probes will also hybridize to nucleic acid molecules in biological samples, thereby enabling immediate applications in chromosome mapping, linkage analysis, tissue identification and/or typing, and a variety of forensic and diagnostic methods of the invention. Similarly, polypeptides identified from SEQ ID NO:Y may be used to generate antibodies which bind specifically to these polypeptides, or fragments thereof, and/or to the polypeptides encoded by the cDNA clones identified in, for example, Table 1A.

[080] Nevertheless, DNA sequences generated by sequencing reactions can contain sequencing errors. The errors exist as misidentified nucleotides, or as insertions or deletions of nucleotides in the generated DNA sequence. The erroneously inserted or deleted nucleotides cause frame shifts in the reading frames of the predicted amino acid sequence. In these cases, the predicted amino acid sequence diverges from the actual amino acid sequence, even though the generated DNA sequence may be greater than 99.9% identical to the actual DNA sequence (for example, one base insertion or deletion in an open reading frame of over 1000 bases).

[081] Accordingly, for those applications requiring precision in the nucleotide sequence or the amino acid sequence, the present invention provides not only the generated nucleotide sequence identified as SEQ ID NO:X, and a predicted translated amino acid sequence identified as SEQ ID NO:Y, but also a sample of plasmid DNA containing cDNA Clone ID NO:Z (deposited with the ATCC on October 5, 2000, and receiving ATCC designation numbers PTA 2574 and PTA 2575; deposited with the ATCC on January 5, 2001, having the depositor reference numbers TS-1, TS-2, AC-1, and AC-2; and/or as set forth, for example, in Table 1A, 6 and 7). The nucleotide sequence of each deposited clone can readily be determined by sequencing the deposited clone in accordance with known methods. Further, techniques known in the art can be used to verify the nucleotide sequences of SEQ ID NO:X.

[082] The predicted amino acid sequence can then be verified from such deposits. Moreover, the amino acid sequence of the protein encoded by a particular clone can also be directly determined by peptide sequencing or by expressing the protein in a suitable host cell containing the deposited human cDNA, collecting the protein, and determining its sequence.

RACE Protocol For Recovery of Full-Length Genes

[083] Partial cDNA clones can be made full-length by utilizing the rapid amplification of cDNA ends (RACE) procedure described in Frohman, M.A., et al., Proc. Nat'l. Acad. Sci. USA, 85:8998-9002 (1988). A cDNA clone missing either the 5' or 3' end can be reconstructed to include the absent base pairs extending to the translational start or stop codon, respectively. In some cases, cDNAs are missing the start codon of translation. The following briefly describes a modification of this original 5' RACE procedure. Poly A⁺ or total RNA is reverse transcribed with Superscript II (Gibco/BRL) and an antisense or complementary primer specific to the cDNA sequence. The primer is removed from the reaction with a Microcon Concentrator (Amicon). The first-strand cDNA is then tailed with dATP and terminal deoxynucleotide transferase (Gibco/BRL). Thus, an anchor sequence is produced which is needed for PCR amplification. The second strand is synthesized from the dA-tail in PCR buffer, Taq DNA polymerase (Perkin-Elmer Cetus), an oligo-dT primer containing three adjacent restriction sites (XhoI, SalI and ClaI) at the 5' end and a primer containing just these restriction sites. This double-stranded cDNA is PCR amplified for 40 cycles with the same primers as well as a nested cDNA-specific antisense primer. The PCR products are size-separated on an ethidium bromide-agarose gel and the region of gel containing cDNA products the predicted size of missing protein-coding DNA is removed. cDNA is purified from the agarose with the Magic PCR Prep kit (Promega), restriction digested with XhoI or SalI, and ligated to a plasmid such as pBluescript SKII (Stratagene) at XhoI and EcoRV sites. This DNA is transformed into bacteria and the plasmid clones sequenced to identify the correct protein-coding inserts. Correct 5' ends are confirmed by comparing this sequence with the putatively identified homologue and overlap with the partial cDNA clone. Similar

methods known in the art and/or commercial kits are used to amplify and recover 3' ends.

[084] Several quality-controlled kits are commercially available for purchase. Similar reagents and methods to those above are supplied in kit form from Gibco/BRL for both 5' and 3' RACE for recovery of full length genes. A second kit is available from Clontech which is a modification of a related technique, SLIC (single-stranded ligation to single-stranded cDNA), developed by Dumas et al., *Nucleic Acids Res.*, 19:5227-32 (1991). The major differences in procedure are that the RNA is alkaline hydrolyzed after reverse transcription and RNA ligase is used to join a restriction site-containing anchor primer to the first-strand cDNA. This obviates the necessity for the dA-tailing reaction which results in a polyT stretch that is difficult to sequence past.

[085] An alternative to generating 5' or 3' cDNA from RNA is to use cDNA library double-stranded DNA. An asymmetric PCR-amplified antisense cDNA strand is synthesized with an antisense cDNA-specific primer and a plasmid-anchored primer. These primers are removed and a symmetric PCR reaction is performed with a nested cDNA-specific antisense primer and the plasmid-anchored primer.

RNA Ligase Protocol For Generating The 5' or 3' End Sequences To Obtain Full Length Genes

[086] Once a gene of interest is identified, several methods are available for the identification of the 5' or 3' portions of the gene which may not be present in the original cDNA plasmid. These methods include, but are not limited to, filter probing, clone enrichment using specific probes and protocols similar and identical to 5' and 3' RACE. While the full length gene may be present in the library and can be identified by probing, a useful method for generating the 5' or 3' end is to use the existing sequence information from the original cDNA to generate the missing information. A method similar to 5' RACE is available for generating the missing 5' end of a desired full-length gene. (This method was published by Fromont-Racine et al., *Nucleic Acids Res.*, 21(7):1683-1684 (1993)). Briefly, a specific RNA oligonucleotide is ligated to the 5' ends of a population of RNA presumably containing full-length gene RNA transcript. A primer set containing a primer specific to the ligated RNA oligonucleotide and a primer specific to a known sequence of the gene of interest, is

used to PCR amplify the 5' portion of the desired full length gene which may then be sequenced and used to generate the full length gene. This method starts with total RNA isolated from the desired source, poly A RNA may be used but is not a prerequisite for this procedure. The RNA preparation may then be treated with phosphatase if necessary to eliminate 5' phosphate groups on degraded or damaged RNA which may interfere with the later RNA ligase step. The phosphatase, if used, is then inactivated and the RNA is treated with tobacco acid pyrophosphatase in order to remove the cap structure present at the 5' ends of messenger RNAs. This reaction leaves a 5' phosphate group at the 5' end of the cap cleaved RNA which can then be ligated to an RNA oligonucleotide using T4 RNA ligase. This modified RNA preparation can then be used as a template for first strand cDNA synthesis using a gene specific oligonucleotide. The first strand synthesis reaction can then be used as a template for PCR amplification of the desired 5' end using a primer specific to the ligated RNA oligonucleotide and a primer specific to the known sequence of the reproductive system antigen of interest. The resultant product is then sequenced and analyzed to confirm that the 5' end sequence belongs to the relevant reproductive system antigen.

[087] The present invention also relates to vectors or plasmids, which include such DNA sequences, as well as the use of the DNA sequences. The material deposited with the ATCC (deposited with the ATCC on October 5, 2000, and receiving ATCC designation numbers PTA 2574 and PTA 2575; deposited with the ATCC on January 5, 2001, having the depositor reference numbers TS-1, TS-2, AC-1, and AC-2; and/or as set forth, for example, in Table 1A, 6 and 7) is a mixture of cDNA clones derived from a variety of human tissue and cloned in either a plasmid vector or a phage vector, as shown, for example, in Table 7. These deposits are referred to as "the deposits" herein. The tissues from which some of the clones were derived are listed in Table 7, and the vector in which the corresponding cDNA is contained is also indicated in Table 7. The deposited material includes cDNA clones corresponding to SEQ ID NO:X described, for example, in Table 1A (Clone ID NO:Z). A clone which is isolatable from the ATCC Deposits by use of a sequence listed as SEQ ID NO:X, may include the entire coding region of a human gene or in other cases such clone may include a substantial portion of the coding region of a human gene. Furthermore,

although the sequence listing may in some instances list only a portion of the DNA sequence in a clone included in the ATCC Deposits, it is well within the ability of one skilled in the art to sequence the DNA included in a clone contained in the ATCC Deposits by use of a sequence (or portion thereof) described in, for example Tables 1A or 2 by procedures hereinafter further described, and others apparent to those skilled in the art.

[088] Also provided in Table 7 is the name of the vector which contains the cDNA clone. Each vector is routinely used in the art. The following additional information is provided for convenience.

[089] Vectors Lambda Zap (U.S. Patent Nos. 5,128,256 and 5,286,636), Uni-Zap XR (U.S. Patent Nos. 5,128,256 and 5,286,636), Zap Express (U.S. Patent Nos. 5,128,256 and 5,286,636), pBluescript (pBS) (Short, J. M. et al., *Nucleic Acids Res.* 16:7583-7600 (1988); Altting-Mees, M. A. and Short, J. M., *Nucleic Acids Res.* 17:9494 (1989)) and pBK (Altting-Mees, M. A. et al., *Strategies* 5:58-61 (1992)) are commercially available from Stratagene Cloning Systems, Inc., 11011 N. Torrey Pines Road, La Jolla, CA, 92037. pBS contains an ampicillin resistance gene and pBK contains a neomycin resistance gene. Phagemid pBS may be excised from the Lambda Zap and Uni-Zap XR vectors, and phagemid pBK may be excised from the Zap Express vector. Both phagemids may be transformed into *E. coli* strain XL-1 Blue, also available from Stratagene.

[090] Vectors pSport1, pCMVSPORT 1.0, pCMVSPORT 2.0 and pCMVSPORT 3.0, were obtained from Life Technologies, Inc., P. O. Box 6009, Gaithersburg, MD 20897. All Sport vectors contain an ampicillin resistance gene and may be transformed into *E. coli* strain DH10B, also available from Life Technologies. See, for instance, Gruber, C. E., et al., *Focus* 15:59- (1993). Vector lafmid BA (Bento Soares, Columbia University, New York, NY) contains an ampicillin resistance gene and can be transformed into *E. coli* strain XL-1 Blue. Vector pCR[®]2.1, which is available from Invitrogen, 1600 Faraday Avenue, Carlsbad, CA 92008, contains an ampicillin resistance gene and may be transformed into *E. coli* strain DH10B, available from Life Technologies. See, for instance, Clark, J. M., *Nuc. Acids Res.* 16:9677-9686 (1988) and Mead, D. et al., *Bio/Technology* 9: (1991).

- [091] The present invention also relates to the genes corresponding to SEQ ID NO:X, SEQ ID NO:Y, and/or the deposited clone (Clone ID NO:Z). The corresponding gene can be isolated in accordance with known methods using the sequence information disclosed herein. Such methods include preparing probes or primers from the disclosed sequence and identifying or amplifying the corresponding gene from appropriate sources of genomic material.
- [092] Also provided in the present invention are allelic variants, orthologs, and/or species homologs. Procedures known in the art can be used to obtain full-length genes, allelic variants, splice variants, full-length coding portions, orthologs, and/or species homologs of reproductive system associated genes corresponding to SEQ ID NO:X or the complement thereof, polypeptides encoded by SEQ ID NO:X or the complement thereof, and/or the cDNA contained in Clone ID NO:Z, using information from the sequences disclosed herein or the clones deposited with the ATCC. For example, allelic variants and/or species homologs may be isolated and identified by making suitable probes or primers from the sequences provided herein and screening a suitable nucleic acid source for allelic variants and/or the desired homologue.
- [093] The polypeptides of the invention can be prepared in any suitable manner. Such polypeptides include isolated naturally occurring polypeptides, recombinantly produced polypeptides, synthetically produced polypeptides, or polypeptides produced by a combination of these methods. Means for preparing such polypeptides are well understood in the art.
- [094] The polypeptides may be in the form of the secreted protein, including the mature form, or may be a part of a larger protein, such as a fusion protein (see below). It is often advantageous to include an additional amino acid sequence which contains secretory or leader sequences, pro-sequences, sequences which aid in purification, such as multiple histidine residues, or an additional sequence for stability during recombinant production.
- [095] The polypeptides of the present invention are preferably provided in an isolated form, and preferably are substantially purified. A recombinantly produced version of a polypeptide, including the secreted polypeptide, can be substantially purified using techniques described herein or otherwise known in the art, such as, for example, by the one-step method described in Smith and Johnson, Gene 67:31-40 (1988).

Polypeptides of the invention also can be purified from natural, synthetic or recombinant sources using techniques described herein or otherwise known in the art, such as, for example, antibodies of the invention raised against the reproductive system polypeptides of the present invention in methods which are well known in the art.

[096] The present invention provides a polynucleotide comprising, or alternatively consisting of, the nucleic acid sequence of SEQ ID NO:X, and/or the cDNA sequence contained in Clone ID NO:Z. The present invention also provides a polypeptide comprising, or alternatively, consisting of, the polypeptide sequence of SEQ ID NO:Y, a polypeptide encoded by SEQ ID NO:X or a complement thereof, a polypeptide encoded by the cDNA contained in Clone ID NO:Z, and/or the polypeptide sequence encoded by a nucleotide sequence in SEQ ID NO:B as defined in column 6 of Table 1B. Polynucleotides encoding a polypeptide comprising, or alternatively consisting of, the polypeptide sequence of SEQ ID NO:Y, a polypeptide encoded by SEQ ID NO:X, a polypeptide encoded by the cDNA contained in Clone ID NO:Z and/or a polypeptide sequence encoded by a nucleotide sequence in SEQ ID NO:B as defined in column 6 of Table 1B are also encompassed by the invention. The present invention further encompasses a polynucleotide comprising, or alternatively consisting of, the complement of the nucleic acid sequence of SEQ ID NO:X, a nucleic acid sequence encoding a polypeptide encoded by the complement of the nucleic acid sequence of SEQ ID NO:X, and/or the cDNA contained in Clone ID NO:Z.

[097] Moreover, representative examples of polynucleotides of the invention comprise, or alternatively consist of, one, two, three, four, five, six, seven, eight, nine, ten, or more of the sequences delineated in Table 1B column 6, or any combination thereof. Additional, representative examples of polynucleotides of the invention comprise, or alternatively consist of, one, two, three, four, five, six, seven, eight, nine, ten, or more of the complementary strand(s) of the sequences delineated in Table 1B column 6, or any combination thereof. In further embodiments, the above-described polynucleotides of the invention comprise, or alternatively consist of, sequences delineated in Table 1B, column 6, and have a nucleic acid sequence which is different from that of the BAC fragment having the sequence disclosed in SEQ ID NO:B (see Table 1B, column 5). In additional embodiments, the above-described polynucleotides

of the invention comprise, or alternatively consist of, sequences delineated in Table 1B, column 6, and have a nucleic acid sequence which is different from that published for the BAC clone identified as BAC ID NO:A (see Table 1B, column 4). In additional embodiments, the above-described polynucleotides of the invention comprise, or alternatively consist of, sequences delineated in Table 1B, column 6, and have a nucleic acid sequence which is different from that contained in the BAC clone identified as BAC ID NO:A (see Table 1B, column 4). Polypeptides encoded by these polynucleotides, other polynucleotides that encode these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention. Additionally, fragments and variants of the above-described polynucleotides and polypeptides are also encompassed by the invention.

[098] Further, representative examples of polynucleotides of the invention comprise, or alternatively consist of, one, two, three, four, five, six, seven, eight, nine, ten, or more of the sequences delineated in column 6 of Table 1B which correspond to the same Clone ID NO:Z (see Table 1B, column 1), or any combination thereof. Additional, representative examples of polynucleotides of the invention comprise, or alternatively consist of, one, two, three, four, five, six, seven, eight, nine, ten, or more of the complementary strand(s) of the sequences delineated in column 6 of Table 1B which correspond to the same Clone ID NO:Z (see Table 1B, column 1), or any combination thereof. In further embodiments, the above-described polynucleotides of the invention comprise, or alternatively consist of, sequences delineated in column 6 of Table 1B which correspond to the same Clone ID NO:Z (see Table 1B, column 1) and have a nucleic acid sequence which is different from that of the BAC fragment having the sequence disclosed in SEQ ID NO:B (see Table 1B, column 5). In additional embodiments, the above-described polynucleotides of the invention comprise, or alternatively consist of, sequences delineated in column 6 of Table 1B which correspond to the same Clone ID NO:Z (see Table 1B, column 1) and have a nucleic acid sequence which is different from that published for the BAC clone identified as BAC ID NO:A (see Table 1B, column 4). In additional embodiments, the above-described polynucleotides of the invention comprise, or alternatively consist of, sequences delineated in column 6 of Table 1B which correspond to the same Clone ID NO:Z (see Table 1B, column 1) and have a nucleic acid sequence which is different

from that contained in the BAC clone identified as BAC ID NO:A (see Table 1B, column 4). Polypeptides encoded by these polynucleotides, other polynucleotides that encode these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention. Additionally, fragments and variants of the above-described polynucleotides and polypeptides are also encompassed by the invention.

[099] Further, representative examples of polynucleotides of the invention comprise, or alternatively consist of, one, two, three, four, five, six, seven, eight, nine, ten, or more of the sequences delineated in column 6 of Table 1B which correspond to the same contig sequence identifier SEQ ID NO:X (see Table 1B, column 2), or any combination thereof. Additional, representative examples of polynucleotides of the invention comprise, or alternatively consist of, one, two, three, four, five, six, seven, eight, nine, ten, or more of the complementary strand(s) of the sequences delineated in column 6 of Table 1B which correspond to the same contig sequence identifier SEQ ID NO:X (see Table 1B, column 2), or any combination thereof. In further embodiments, the above-described polynucleotides of the invention comprise, or alternatively consist of, sequences delineated in column 6 of Table 1B which correspond to the same contig sequence identifier SEQ ID NO:X (see Table 1B, column 2) and have a nucleic acid sequence which is different from that of the BAC fragment having the sequence disclosed in SEQ ID NO:B (see Table 1B, column 5). In additional embodiments, the above-described polynucleotides of the invention comprise, or alternatively consist of, sequences delineated in column 6 of Table 1B which correspond to the same contig sequence identifier SEQ ID NO:X (see Table 1B, column 2) and have a nucleic acid sequence which is different from that published for the BAC clone identified as BAC ID NO:A (see Table 1B, column 4). In additional embodiments, the above-described polynucleotides of the invention comprise, or alternatively consist of, sequences delineated in column 6 of Table 1B which correspond to the same contig sequence identifier SEQ ID NO:X (see Table 1B, column 2) and have a nucleic acid sequence which is different from that contained in the BAC clone identified as BAC ID NO:A (See Table 1B, column 4). Polypeptides encoded by these polynucleotides, other polynucleotides that encode these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention. Additionally, fragments and

variants of the above-described polynucleotides and polypeptides are also encompassed by the invention.

[0100] Moreover, representative examples of polynucleotides of the invention comprise, or alternatively consist of, one, two, three, four, five, six, seven, eight, nine, ten, or more of the sequences delineated in the same row of Table 1B column 6, or any combination thereof. Additional, representative examples of polynucleotides of the invention comprise, or alternatively consist of, one, two, three, four, five, six, seven, eight, nine, ten, or more of the complementary strand(s) of the sequences delineated in the same row of Table 1B column 6, or any combination thereof. In preferred embodiments, the polynucleotides of the invention comprise, or alternatively consist of, one, two, three, four, five, six, seven, eight, nine, ten, or more of the complementary strand(s) of the sequences delineated in the same row of Table 1B column 6, wherein sequentially delineated sequences in the table (i.e. corresponding to those exons located closest to each other) are directly contiguous in a 5' to 3' orientation. In further embodiments, above-described polynucleotides of the invention comprise, or alternatively consist of, sequences delineated in the same row of Table 1B, column 6, and have a nucleic acid sequence which is different from that of the BAC fragment having the sequence disclosed in SEQ ID NO:B (see Table 1B, column 5). In additional embodiments, the above-described polynucleotides of the invention comprise, or alternatively consist of, sequences delineated in the same row of Table 1B, column 6, and have a nucleic acid sequence which is different from that published for the BAC clone identified as BAC ID NO:A (see Table 1B, column 4). In additional embodiments, the above-described polynucleotides of the invention comprise, or alternatively consist of, sequences delineated in the same row of Table 1B, column 6, and have a nucleic acid sequence which is different from that contained in the BAC clone identified as BAC ID NO:A (see Table 1B, column 4). Polypeptides encoded by these polynucleotides, other polynucleotides that encode these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention.

[0101] In additional specific embodiments, polynucleotides of the invention comprise, or alternatively consist of, one, two, three, four, five, six, seven, eight, nine, ten, or more of the sequences delineated in column 6 of Table 1B, and the

polynucleotide sequence of SEQ ID NO:X (e.g., as defined in Table 1B, column 2) or fragments or variants thereof. Polypeptides encoded by these polynucleotides, other polynucleotides that encode these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention.

[0102] In additional specific embodiments, polynucleotides of the invention comprise, or alternatively consist of, one, two, three, four, five, six, seven, eight, nine, ten, or more of the sequences delineated in column 6 of Table 1B which correspond to the same Clone ID NO:Z (see Table 1B, column 1), and the polynucleotide sequence of SEQ ID NO:X (e.g., as defined in Table 1A or 1B) or fragments or variants thereof. In preferred embodiments, the delineated sequence(s) and polynucleotide sequence of SEQ ID NO:X correspond to the same Clone ID NO:Z. Polypeptides encoded by these polynucleotides, other polynucleotides that encode these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention.

[0103] In further specific embodiments, polynucleotides of the invention comprise, or alternatively consist of, one, two, three, four, five, six, seven, eight, nine, ten, or more of the sequences delineated in the same row of column 6 of Table 1B, and the polynucleotide sequence of SEQ ID NO:X (e.g., as defined in Table 1A or 1B) or fragments or variants thereof. In preferred embodiments, the delineated sequence(s) and polynucleotide sequence of SEQ ID NO:X correspond to the same row of column 6 of Table 1B. Polypeptides encoded by these polynucleotides, other polynucleotides that encode these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention.

[0104] In additional specific embodiments, polynucleotides of the invention comprise, or alternatively consist of a polynucleotide sequence in which the 3' 10 polynucleotides of one of the sequences delineated in column 6 of Table 1B and the 5' 10 polynucleotides of the sequence of SEQ ID NO:X are directly contiguous. Nucleic acids which hybridize to the complement of these 20 contiguous polynucleotides under stringent hybridization conditions or alternatively, under lower stringency conditions, are also encompassed by the invention. Polypeptides encoded by these polynucleotides and/or nucleic acids, other polynucleotides and/or nucleic acids that encode these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention. Additionally, fragments and variants of the above-

described polynucleotides, nucleic acids, and polypeptides are also encompassed by the invention.

[0105] In additional specific embodiments, polynucleotides of the invention comprise, or alternatively consist of, a polynucleotide sequence in which the 3' 10 polynucleotides of one of the sequences delineated in column 6 of Table 1B and the 5' 10 polynucleotides of a fragment or variant of the sequence of SEQ ID NO:X are directly contiguous. Nucleic acids which hybridize to the complement of these 20 contiguous polynucleotides under stringent hybridization conditions or alternatively, under lower stringency conditions, are also encompassed by the invention. Polypeptides encoded by these polynucleotides and/or nucleic acids, other polynucleotides and/or nucleic acids encoding these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention. Additionally, fragments and variants of the above-described polynucleotides, nucleic acids, and polypeptides are also encompassed by the invention.

[0106] In specific embodiments, polynucleotides of the invention comprise, or alternatively consist of, a polynucleotide sequence in which the 3' 10 polynucleotides of the sequence of SEQ ID NO:X and the 5' 10 polynucleotides of the sequence of one of the sequences delineated in column 6 of Table 1B are directly contiguous. Nucleic acids which hybridize to the complement of these 20 contiguous polynucleotides under stringent hybridization conditions or alternatively, under lower stringency conditions, are also encompassed by the invention. Polypeptides encoded by these polynucleotides and/or nucleic acids, other polynucleotides and/or nucleic acids encoding these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention. Additionally, fragments and variants of the above-described polynucleotides, nucleic acids, and polypeptides are also encompassed by the invention.

[0107] In specific embodiments, polynucleotides of the invention comprise, or alternatively consist of, a polynucleotide sequence in which the 3' 10 polynucleotides of a fragment or variant of the sequence of SEQ ID NO:X and the 5' 10 polynucleotides of the sequence of one of the sequences delineated in column 6 of Table 1B are directly contiguous. Nucleic acids which hybridize to the complement of these 20 contiguous polynucleotides under stringent hybridization conditions or

alternatively, under lower stringency conditions, are also encompassed by the invention. Polypeptides encoded by these polynucleotides and/or nucleic acids, other polynucleotides and/or nucleic acids encoding these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention. Additionally, fragments and variants of the above-described polynucleotides, nucleic acids, and polypeptides, are also encompassed by the invention.

[0108] In further specific embodiments, polynucleotides of the invention comprise, or alternatively consist of, a polynucleotide sequence in which the 3' 10 polynucleotides of one of the sequences delineated in column 6 of Table 1B and the 5' 10 polynucleotides of another sequence in column 6 are directly contiguous. Nucleic acids which hybridize to the complement of these 20 contiguous polynucleotides under stringent hybridization conditions or alternatively, under lower stringency conditions, are also encompassed by the invention. Polypeptides encoded by these polynucleotides and/or nucleic acids, other polynucleotides and/or nucleic acids encoding these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention. Additionally, fragments and variants of the above-described polynucleotides, nucleic acids, and polypeptides are also encompassed by the invention.

[0109] In specific embodiments, polynucleotides of the invention comprise, or alternatively consist of, a polynucleotide sequence in which the 3' 10 polynucleotides of one of the sequences delineated in column 6 of Table 1B and the 5' 10 polynucleotides of another sequence in column 6 corresponding to the same Clone ID NO:Z (see Table 1B, column 1) are directly contiguous. Nucleic acids which hybridize to the complement of these 20 lower stringency conditions, are also encompassed by the invention. Polypeptides encoded by these polynucleotides and/or nucleic acids, other polynucleotides and/or nucleic acids encoding these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention. Additionally, fragments and variants of the above-described polynucleotides, nucleic acids, and polypeptides are also encompassed by the invention.

[0110] In specific embodiments, polynucleotides of the invention comprise, or alternatively consist of, a polynucleotide sequence in which the 3' 10 polynucleotides of one sequence in column 6 corresponding to the same contig sequence identifier

SEQ ID NO:X (see Table 1B, column 2) are directly contiguous. Nucleic acids which hybridize to the complement of these 20 contiguous polynucleotides under stringent hybridization conditions or alternatively, under lower stringency conditions, are also encompassed by the invention. Polypeptides encoded by these polynucleotides and/or nucleic acids, other polynucleotides and/or nucleic acids encoding these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention. Additionally, fragments and variants of the above-described polynucleotides, nucleic acids, and polypeptides are also encompassed by the invention.

[0111] In specific embodiments, polynucleotides of the invention comprise, or alternatively consist of a polynucleotide sequence in which the 3' 10 polynucleotides of one of the sequences delineated in column 6 of Table 1B and the 5' 10 polynucleotides of another sequence in column 6 corresponding to the same row are directly contiguous. In preferred embodiments, the 3' 10 polynucleotides of one of the sequences delineated in column 6 of Table 1B is directly contiguous with the 5' 10 polynucleotides of the next sequential exon delineated in Table 1B, column 6. Nucleic acids which hybridize to the complement of these 20 contiguous polynucleotides under stringent hybridization conditions or alternatively, under lower stringency conditions, are also encompassed by the invention. Polypeptides encoded by these polynucleotides and/or nucleic acids, other polynucleotides and/or nucleic acids encoding these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention. Additionally, fragments and variants of the above-described polynucleotides, nucleic acids, and polypeptides are also encompassed by the invention.

[0112] Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. Accordingly, for each contig sequence (SEQ ID NO:X) listed in the third column of Table 1A, preferably excluded are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 and the final nucleotide minus 15 of SEQ ID NO:X, b is an integer of 15 to the final nucleotide of SEQ ID NO:X, where both a and b correspond to the positions

of nucleotide residues shown in SEQ ID NO:X, and where b is greater than or equal to $a + 14$. More specifically, preferably excluded are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a and b are integers as defined in columns 4 and 5, respectively, of Table 3. In specific embodiments, the polynucleotides of the invention do not consist of at least one, two, three, four, five, ten, or more of the specific polynucleotide sequences referenced by the Genbank Accession No. as disclosed in column 6 of Table 3 (including for example, published sequence in connection with a particular BAC clone). In further embodiments, preferably excluded from the invention are the specific polynucleotide sequence(s) contained in the clones corresponding to at least one, two, three, four, five, ten, or more of the available material having the accession numbers identified in the sixth column of this Table (including for example, the actual sequence contained in an identified BAC clone). In no way is this listing meant to encompass all of the sequences which may be excluded by the general formula, it is just a representative example. All references available through these accessions are hereby incorporated by reference in their entirety.

TABLE 3

Clone ID NO: Z	SEQ ID NO: X	Contig ID:	EST Disclaimer Range of a	Range of b	Accession #'s
H7MCE35	11	928554	1 - 59	15 - 73	AI139000, AA884996, AA896649, and AA724461.
H7MDC49	12	722780	1 - 148	15 - 162	AW182856, AI218191, AA834537, AA804628, AA827835, AF034780, and E07989.
H7MDD72	13	847688	1 - 592	15 - 606	AI681511, AA677498, AI799484, AI360937, AI378075, AI457270, AI363333, AI681227, AI806180, AI363339, AA972313, AA627925, AI984311, AA483815, N25951, AI250808, AI417147, AW297301, AI079688, AW009637, AI289263, AA768395, AA769533, AW085089, AW368116, AW067835, AI110587, N26848, W15533, AI129095, AW298190, AI300955, AI870137, AW410019, AI808400, AA748383, AA479673, AW269239, AA281561, AA807144, AW291197, AW373450, and N42781.
HAQAK73	15	764671	1 - 728	15 - 742	H93040, H93056, AA719305, AA808945, AI342677, AA742815, AC006581, AP000045, AP000113, AC007684, AC002404, AC003070, AC003042, AP000327, AC003043, AC005829, AB023048, AP000123, AP000170, AP000055, AC007066, AC002350, AC005399, AI135744, AC005031, AF001549, AC004913, Z95114, AL031663, AL008729, Z97054, AL133355, AC000381, AC005207, AC009516, U80017, Z81370, AC006023, AC006449, AC005296, AC005069, AC000118, AC004821, AC006146, AC005037, AC006441, AL109798, AL031432, AL080243, AC004819, AL109627, AC002477, and AC004882.
HAQAM17	16	664979	1 - 347	15 - 361	
HAQBF84	17	783259	1 - 56	15 - 70	
HAQBJ71	18	839982	1 - 409	15 - 423	
HAQBQ50	19	522004	1 - 83	15 - 97	
HAQBS37	20	847519	1 - 710	15 - 724	AW168869, and AI904433.
HAUBD69	21	529711	1 - 121	15 - 135	
HAUBU10	22	968339	1 - 324	15 - 338	AW419224, AW419225, and AW419223.
HBCJS08	23	957826	1 - 492	15 - 506	AL119483, AA809125, AL119444, AA835346, AA188940, AC016027, AC016830, AC005529, AC005261, AC004531, AC005255, AC006137, AC006080, AL049874, AL132777, L44140, AL031983, AC006515, AC004659, Z85987, AC005531, AF134726, AC006441, AC004858, AF053356, AP000552, AC005740, AP000503, AC012627, AC004882, AC003108, AC007934, AL049758, AC005181, AF109907, AC004033, AC005091, AC007685, AC005971, AC003663, AC005274, AC005089, AL049829, AC006449, U96629, AC004973, AL049872, AC007283, AC005057, AC004231, AL035413, AL078638, AC006023, AC005815, AL031311, AL023803, AC005821, AL049780, AL031228, AC005919, AP000555, AL049631, AC004895, AC005072, AC005736, AL021155, AL022165, AL133448, AL133245, AC007055, AL008718, AC004526,

					AC007065, AL049776, U07563, AL035681, AP000114, AP000046, AF205588, AC005231, AC005841, AC004491, AC007193, AC007878, AL031591, AF038458, AL049869, AC012384, AC003002, AL133485, AL109984, AC004983, AL121653, AC005049, AC005839, AC002418, AC004386, D84401, AC003037, AC002091, AL049538, AC002070, AF045555, Z93244, AC006468, AL022316, AC006141, AC004854, AC005067, AC005768, AC007993, AL008719, AC004522, AC004099, AC006512, AC005088, AC004884, AL031427, AD000092, AC005624, AL109758, Z70281, AC004859, AC005081, AL079295, AC002425, AB026898, AC004985, AL035072, AC005484, AC004816, AC005914, AL121754, AC004890, AC005746, AL121757, Z86090, AL109627, AL133163, AC000003, AC009721, Z82250, AC007057, and AC005071.
HBCPD14	24	963634	1 - 127	15 - 141	
HBCQJ03	25	922401	1 - 124	15 - 138	AW392670, Z99396, AL119319, AL036418, AL036858, AW372827, AW384394, AL119457, AL119483, AL119324, AW363220, AL119484, AL119391, AL119497, AL119522, U46351, AL119418, AL119355, AL119443, AL119363, AL037094, AL119341, U46341, AL134902, AL119396, U46349, AL119401, U46350, U46347, AL042551, AL037205, AL119335, AL119496, AL119439, AL134536, AL036196, AL037082, AL119444, AL134525, AL036268, U46346, AL038837, AL042614, AL134920, AL043019, AL042984, AL037051, AL042965, AL042975, AL036725, AL042544, AA631969, AL119399, AL134538, U46345, AL042542, AL043029, AL042450, AL043003, AL036924, AL037526, AL119464, AR066494, AR060234, A81671, AB026436, AD001527, AR054110, AR023813, AR064707, and AR069079.
HBCQS90	26	951787	1 - 507	15 - 521	AA191298, AW364854, AL205727, R16601, and AL188004.
HBCQS93	27	930682	1 - 607	15 - 621	AA703200, W88470, and Z39990.
HGBBD28	28	525846	1 - 314	15 - 328	
HGBBF56	29	957870	1 - 240	15 - 254	
HGBBG42	30	922396	1 - 689	15 - 703	N33183, AA169202, AI393342, AW172574, AA731731, AI961101, AA872188, W17122, AI219418, AA609341, AA485152, AW293905, AI221103, AI910881, AW195626, AA856740, AA767183, AW072218, AA929018, AI338682, AA836394, AA448345, AW293908, AI264116, W26762, AA766127, AA761418, H30745, AA315954, AI022328, AI032738, AI203338, AI768542, AI979322, AA470714, AA303837, AA992529, AA764904, AA627584, AA769119, AA169659, AI217749, W70324, AA333338, AI250852, AI635634, AI147877, AI382313, AI377000, AI520946, AI955310, AL036241, AI638523, AI589668, AA814517, AA001397, AL096773, AF122922, and Y14314.
HGBBH43	31	524532	1 - 183	15 - 197	AI863446, AI188331, AW014913, AI073437, AW291378, AI130693, AI768987, and AA890464.
HGBBS07	32	954299	1 - 403	15 - 417	AA229977, N41881, N23545, H78888, H54240, AW270016, and AA569612.
HGBBT79	33	525352	1 - 318	15 - 332	
HGBBW60	34	954916	1 - 555	15 - 569	AI808278, AI697307, AI936570, AW167940, AI379188, AI669686, AI751739, AW450137.

						AI868311, AI203915, AW182104, AW014255, AI766481, AI821507, AA548667, AA194990, AF061970, U81600, and X52875.
HBGBW72	35	524956	1 - 321	15 - 335		
HBGDA44	36	525618	1 - 493	15 - 507		
HBGDE85	37	524875	1 - 125	15 - 139		
HBGDS13	38	971696	1 - 245	15 - 259		
HBGDT43	39	974223	1 - 433	15 - 447		AI567076, AW270343, AA169263, AW275510, AI801482, AA362511, AI933534, AA847499, AA580808, AA226363, AA502104, AI311977, AA569471, AI042753, AL048925, AA502860, AI133297, AI499588, AW021583, AA531079, AW248819, F25733, AW341900, AA101689, R86151, AA494102, AA482923, AA715255, AA715267, AA516222, AA758934, AI783494, AA602047, AI751216, AA664909, T60681, AA320966, AI119691, AA428792, AA828042, AI445674, AW062724, AA493695, AW302013, AA469451, AI281881, AW193461, AI919265, AA484679, AA632612, AI085719, AA601202, AA653375, AA491862, AA713891, AI687343, AA491650, AI584186, AA468456, AA757775, AW438643, AI036037, AA577959, AI873990, AA568869, AA515334, AA668807, AA508359, AI872020, AW023990, AA643455, AI282511, AA658362, AA724333, H73082, AI538870, AW073060, AA908687, AA487621, AA493621, AA620467, AI471887, AI368256, AI240168, AI345157, AI038705, AA683238, AI568678, H71429, AA662225, AA470969, AI797903, AA488746, AA719292, AA846952, AA804925, AW084466, F27407, AA837791, AI589461, AA747594, AI933299, AI564454, AI924872, AA572713, AI708139, AA490183, AA019312, AI583283, AI054343, AI042547, AW274349, AA811153, AA446544, F17555, AA368059, AW050498, AI338350, AA478355, AA773472, AA634889, AA502155, AA665021, AI247199, AI559251, R02632, AA484373, AW050734, AW235497, R40056, AW193265, AW273218, AW021207, AI472222, AA633753, AW408047, AW303196, AI350211, AW301809, AA668639, AA584581, AA573725, AW247819, AI669453, AA805846, T06754, T09071, AA623002, AW104030, AA806796, AA773902, AA577906, AI625647, AA515909, AI521679, AW302903, AA483223, AI801600, AA581903, AW075948, AI692808, AA503600, AI284640, AI589230, AI744995, AI860013, AW407578, AA629874, AW327868, AI702314, AA181823, AA704009, AA189117, AA743716, AI135377, AI044858, AI859742, AA179944, AI110844, AI110770, AW300625, AI754658, AI119984, AI354388, AI285576, AI873852, AI903462, AA487417, N64587, AW131155, AW301350, AA578861, AA493708, AW196064, AI241821, AI119166, T74382, AI807762, AI381253, AA828767, AI656840, AA501615, AA758366, AI078634, U82671, AP000569, AP000301, AC006255, AP000114, AP000045, AC005668, AC007556, AC007878, AC005191, AF085954, AC005089, AC005261, AI133276, U67827, X75335, AC006571, Z68278, AF039906, AI022320, AI049758, AC007286, AC012599, AC004230, AC002310, AC005385, U62317, Z97053, AC004112, AL022316, AC010200, AC002091, AL031283, AF107885, AC005284, AC005406,

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HBGFA62	40	954306	1 - 628	15 - 642	AL079262, AW082836, AA877924, AA513292, AA700228, AI244885, AL041763, AI345227, AW275318, D25718, AW001271, AI902419, AA687630, AI349742, AI306060, AI309420, AI307478, AI343141, AW075033, AI266766, AI371550, and AW075142.
HBGMD05	41	870189	1 - 575	15 - 589	AW393804, AW001436, W42981, AI766185, AA706041, AI365102, AI380655, AW290901, and AI126989.
HBGMD62	42	933763	1 - 315	15 - 329	Z98258.
HBGMF10	43	966132	1 - 555	15 - 569	AA532449, AA043318, AI872402, AI524324, AA527086, AA514662, AA659799, AA971274, AA470758, AA602448, AI022054, AA861977, AI636322, AI865691, AI209021, AI055999, AA640580, AA053310, T52958, AI313402, AA058606, AW166625, AW004703, AI348693,

						AA436104, T61144, T52957, AI696664, AA043317, AW449638, AA129864, AI499456, AI972817, AI424348, AI918494, and AA436005.
HBGMG29	44	845194	1 - 328		15 - 342	
HBGMZ39	45	947112	1 - 588		15 - 602	AI820661, AI791493, AA989356, AI791282, AI732537, AI792053, AW207804, R22360, R72427, AA505927, R22019, and R72474.
HBGNA08	46	958257	1 - 223		15 - 237	
HBGND09	47	848219	1 - 1164		15 - 1178	
HBGNJ14	48	914594	1 - 317		15 - 331	AA781868, AW152318, AA482996, AA909463, AA758672, and AF156271.
HBGNM13	49	912730	1 - 348		15 - 362	AC004156.
						AW177440, CI4389, T03269, AI905856, AW352117, AW179328, AW360811, AW178893, AW366296, AW375405, D58283, AW378532, D59859, D80022, CI4331, D80166, D80195, AW177501, D80193, D59927, D59467, D51423, D59619, AW177511, D80210, D51799, D80391, D80164, D59275, D80240, D80253, D80043, D59787, D80227, D59502, D81030, D80212, D80196, D80188, D80219, CI4014, AW176467, CI5076, D80038, D80269, D59610, D57483, D80366, AA305409, CI4429, D51022, D50979, D50995, D59889, AW178762, D80024, AW377671, D80378, AW178775, AW360844, D80045, AW360817, AA305578, D51060, AW375406, AW378534, AW179332, AW377672, AW179023, AW178905, D80134, D81026, D51097, AW352170, AW352158, AW352171, AW377676, AW177731, AW178907, AW178906, D80248, AW179019, AW179024, D80522, AA514186, AA514188, C75259, D80133, AW177505, AW179020, D58253, AW178909, AW177456, D80251, AW179329, AW178980, AW177733, AW378528, AW178908, AW178754, AW179018, D80132, AW367967, D80268, AW179004, D80302, AW178914, AW178911, D80439, D80247, AW178774, AW352174, T48593, AW177723, AW178983, D51103, AW367950, AW178986, AI535850, D45260, X82626, A84916, A67220, D89785, A62300, A62298, Y17188, A78862, D34614, D26022, D88547, AI132110, AR018138, X67155, A25909, AR025207, AB028859, AR008278, Y12724, AF058696, AB012117, A94995, AR008443, A85396, AR066482, I18367, A44171, A85477, I19525, A86792, I50126, I50132, I50128, I50133, X93549, AR066488, D88507, A82595, AR066490, AR016514, D13509, D50010, AR060138, A45456, A26615, AR052274, Y09669, AR060385, AB002449, AR066487, A43192, A43190, AR038669, A30438, AR008408, U79457, AR060133, AF135125, and AR008382.
HBGNO07	50	952212	1 - 369		15 - 383	AA488707, AA129219, H49568, AI345366, AI310873, AA476397, AA535216, AA086368, AI268334, AI268336, AW021583, AI500453, AA420998, AA421078, AA657835, AL041345, T11634, AA601327, AA431949, AI762314, AA676971, AW157005, AA346367, AI537041, AW008450, AA600869, AA346368, AI051037, AA493621, AA527209, AA186329, AA533281, AA186367, AA579367, AA683238, AA418861, AI884383, AA744018, AA776899, N23392, AI038736, AA478716, N29455, AI702314, AW276835, AA833896, AA833875, AA484373, H56430, AI028510, AA992126, AA579208, AW189384, H49091, AI469599, AA522642,

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HBGNQ31	51	887152	1 - 355	15 - 369	AI097455, AW073155, AI690321, AA283204, AI739096, and AI968607.
HBGNW29	52	969396	1 - 421	15 - 435	AI809990.
HBGOB07	53	883111	1 - 465	15 - 479	R15924, AI796491, AI346263, AA767342, AW173117, AW148990, AA860973, AI014603, AI640629, AI658566, AA506436, AI368262, AA768887, AI500714, AI355779, AI458779, AI811626, AW081866, AA761573, AI683292, AI472126, S69381, AL008706, AF106657, and T66550.
HBGOJ28	54	967261	1 - 585	15 - 599	AW406518, R27278, W05444, W87344, AI159814, N56542, W87345, AA053475, AI905956, TS3519, AW004657, AI743733, AA468421, AW001343, AA860298, and AA578670.
HBGOK53	55	848156	1 - 621	15 - 635	AI459692, AW150902, AA781854, AI823723, and AC006255.
HBGOL08	56	958290	1 - 449	15 - 463	AA113287, D29499, AW294903, AW298373, AW297351, AW294452, Z40314, AI623657, D29192, and AI143487.
HBGPE04	57	926876	1 - 480	15 - 494	Z98049.
HBGPH02	58	918513	1 - 508	15 - 522	AI167166, AI034322, AA084622, AA457685, AI246080, AA448838, AI754291, AW243793, AI285521, AI816537, H55894, AC003037, Z97054, AC005913, AC006077, AL023879, AC003007, AC004953, AC005632, AP000356, AL049776, AC003108, AL035086, AF134471,

AC002126, AC016027, AL022323, AC006312, AL133448, AJ003147, AC020663, AC005908, AL031295, AC005972, AC003051, AC016830, AC007845, AL096701, AC009509, AC006040, AC002432, AC006211, AC008126, AF196779, AC006538, AL096791, AC007686, AC002470, AC009516, AL008718, AC016025, AC005071, AC007308, AP000555, AL139054, AC005971, AP000501, AC006536, AL135744, AC003109, AC002365, AC004257, AC003029, AC006254, AC002351, AC004148, AC005015, AL080243, AC005412, AF207550, AC005057, AC003104, L78810, AC006111, AL133249, AL031662, AL022165, AL121655, AL035415, AF067844, AC008044, AL031432, AC007216, AC005778, AC008372, AC003110, AC004167, AC005696, AL049692, AL021453, AC009464, AC007011, AL022326, AC007285, AC012627, AF031078, AL023807, AC000068, AL024498, U95740, AF111169, AF030876, AC005409, AC000134, AL035455, AL022476, AL022316, AC007363, AL034548, AC004990, AC011311, AC005841, AB023049, AC006468, AC004813, AP000512, AC005529, AC004024, AL024507, AL033527, AL022163, AL034549, AC004883, AC004448, AL117344, AC003101, AC007240, AC005920, AP000503, AC007688, AL031311, AC004821, AC005411, AC005519, AC002456, AL133163, AC002312, AC004859, AF091512, AC007488, AC005488, AL031255, AC005940, AC004934, Z82215, AC005484, AC005081, U78027, AC010206, AL133245, AL008582, Z93023, AC006511, AC006285, AL132712, AC002531, AC005666, AC004019, AC006965, and Z951114.	HBGPK33	59	973425	1 - 696	15 - 710	
	HBGPFV05	60	930706	1 - 607	15 - 621	
	HBGGQG66	61	954302	1 - 356	15 - 370	
	HBGSD40	62	923142	1 - 526	15 - 540	AI554033, AW072396, AI391722, AI703323, AI278195, AI681504, AW015130, AI378014, AI869650, AA028102, AW341627, AI674186, AA253036, AA918302, AI242366, H27749, RS2130, AI203836, AA253072, AI473245, H18391, H29918, H45059, H46854, H46789, H18178, H18179, H46768, H45025, AA028123, H29829, H46718, and H18392.
	HBGTL01	63	965509	1 - 261	15 - 275	
	HBGTR84	64	914573	1 - 636	15 - 650	AI333621, AI655982, AI635579, AW014176, AI365145, AA758176, and Z97986.
	HBGTR84	65	886529	1 - 753	15 - 767	
	HBGTR84	66	966536	1 - 126	15 - 140	AI865067, AW272770, Z28887, R71650, H97886, AA564346, H68773, H59762, AA025159, AA025578, AA129730, AA167746, AA416665, AI359427, AA908506, AA554889, AI040310, AA890292, AW085815, AA292680, AI192586, AI672645, AI086456, AI086880, AI289899, AA524469, AA708866, AA630222, AI435170, AI192590, AI027640, AA541738, AI660871, AI346559, AI970609, AA873432, AA815359, AI300157, AI300558, AI346676, AW044620, AI982695, AI986013, N23343, AA872691, AA741346, AA873873, AA777182, AA857133, AA676868, N53944, H80871, N53661, R31880, H51417, R85259, AA775814, R31095, AA906957, H57155, N93620, H02122, AA659321, AW020771, N28815, AA417245, AI422162, H96301, H51459, AA025977, AA133344, H23915, and AF129332.

HBNAF14	67	660800	1 - 267	15 - 281	
HBNAI71	68	655514	1 - 321	15 - 335	
HBNAI41	69	655842	1 - 299	15 - 313	
HBNAW92	70	524954	1 - 274	15 - 288	AF107885.
HBNAW71	71	530843	1 - 73	15 - 87	
HBNAW58	72	558193	1 - 492	15 - 506	
HBNT52	73	524869	1 - 366	15 - 380	
HBZAJ09	74	655769	1 - 329	15 - 343	
HBZSH16	75	655619	1 - 384	15 - 398	
HBZSH71	76	760418	1 - 288	15 - 302	AI339869, AA669158, AI589895, AI055909, AW131819, AA994746, AI055952, AW072134, AA504384, AA588867, AA558699, and AA504125.
HBZSI73	77	655737	1 - 339	15 - 353	
HBZSK17	78	664013	1 - 369	15 - 383	AA300051, AA317019, AA086322, AA147482, AA112027, AI903350, AI903380, AI903419, R48705, AC005005, AF115565, Y13492, AJ010306, AF064238, and Z49989.
HCBMV01	79	914333	1 - 310	15 - 324	AI493588, AL134598, AA928539, AI500061, AI440260, AI539690, AW300782, AW300889, AW089844, AA641818, N22276, AI335235, W48671, AL0406926, AI766348, AI587114, AI114703, AI473536, AW020046, AI631240, AL118752, AI349279, AW020419, AI702065, AW075382, AI251221, AI687130, AL047422, AL038605, AW022102, AI539260, AW020693, AI590043, AI336513, AI969655, AI307569, AL048323, AI348895, AI307494, AL047172, AI336495, AI335476, AI335363, AI815855, AL048340, AI340627, AI334450, AA555145, AW021662, AI348854, AI344935, AI334895, AI866465, AI865116, AI349245, AI559752, AI538850, AI499570, AI310930, AI446721, AI567971, AA503384, AI401697, AI538564, AL118781, AI312261, AI349958, AL046200, AL047344, AI349814, AI638644, H41759, AI336503, AI866646, AW020397, AW301861, AI267185, AI345005, H92687, AI553645, N25033, AL047655, AW023338, AI349186, AI538764, AI784233, AI340511, AA808175, AW059828, AI866503, AI345014, AW022494, AW020288, AI584118, AW162189, AA420722, AW020095, AI624543, AL046227, AW021717, AI345527, AI345745, AL120756, AI538885, AI340552, AI690411, AI579901, AI345736, AI345131, AL047100, AI758583, AA502794, AW086082, AA659314, AI307736, AI335208, AI581033, AW020710, AL042745, F28295, N29277, AI633125, AI366959, AA635382, AA176980, AI815232, AI868475, AI572096, AL045413, AI500714, AI343030, N67350, AI538008, AI471909, AI567883, AI312210, AI923989, AI284517, AI560545, AI627714, AI619820, AW059766, AI207656, AI611728, AW151138, AI241678, AI634736, AI348969, AW022636, AI927233, AA062896, AA042949, AI340603, AI801325, AI537273, AI682934, AI371251, AW152182, AI702527, AI472487, AI436429, AI859991, N81164, AI564716, AL079963, AI690472, AL036705, AI500662, AI624304, AI366992, T99953, AI698391, AW079768, AI868180, AI784214, AI800367.

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HCBNW02	80	950897	1 - 508	15 - 522		
HCBNW07	81	951820	1 - 415	15 - 429		A1419479, A1084317, AW072920, A1350149, AA847656, AA931572, A1423647, A1983432, A1056162, AA826926, A1478982, T50766, C00534, and AC005803.
HCB0G03	82	922351	1 - 469	15 - 483		
HCDMB01	83	915613	1 - 430	15 - 444		AL042428.
HCDMB16	84	835781	1 - 261	15 - 275		
HCDMB60	85	726339	1 - 107	15 - 121		A1590413, A1869343, A1955933, AA593639, A1886450, AA576909, A1371486, A1971730, AA602301, A1421322, A1383426, A1371487, AW059533, AA858249, C00365, Z41784, F17104, A1200274, AW166558, AW337598, AA232052, AA280665, AA731352, AA729138, AW206613, AW241202, M62039, A1932508, AA769242, A1865740, A1866738, A1858186, H12707, AA434237, A1863089, A1874192, N22963, A1349363, A1161110, AA622939, A1625498, AA280821, AW264859, AW198004, A1689114, A1298884, A1311832, W93266, AW152359, AA905965, AA280666, AA044299, H20483, AW273322, AW117633, AA872094, A1811143, AW268474, AA838719, A1858578, AW303327, AW081605, N63438, A1744276, A1992061, AA603101, A1189379, T78004, H62603, AW291643, R72899, H53116, AW193894, H52807, H42028, A1521005, AA745254, A1819014, A1624624, A1859693, A1613489, A1473536, A1696603, A1284013, T69241, AA831128, A1818562, A1674627, AA102339, AL042193, AF106657, AF184965, AL137488, AF060866, X69026, A58545, AL137284, AF076633, AC010077, AL137657, AL080154, AL050155, AL137480, and AJ005690.
HCDMC01	86	915239	1 - 1444	15 - 1458		A1201296, AA421493, A1015515, AA401557, AA693498, AA815294, AA609724, AA608961, AA705839, A1016248, AA400144, AA971327, A1656796, AA383127, AA725026, AA815293, AA609137, AA421507, A1024165, and AC005789.
HCDMD23	87	676799	1 - 171	15 - 185		
HCHAD40	88	923764	1 - 337	15 - 351		AL039087, AL037259, A91754, A49700, AR031375, A58521, AR020969, A44171, I56772, I95540, A63067, A51047, A63064, A63072, AR068507, AR068506, AR031374, AR018924, AR000006, AR015960, AR000007, AR015961, AR051651, A94046, A94054, I58322, I58323, A38214, A49701, E12566, E12564, E12565, A18051, I01012, E02455, AR067785, A00782, A14595, A18755, I12245, A92666, A25856, A92667, A18050, A02741, I77211, AR007512, A80476, A80477, I56770, I56771, I25041, AR027319, A91752, A91751, AR027318, A95274, Z73334, A06633, AR029417, I58669, I85513, AR067733, AR027100, AR009152, AR009151, AR027099, I07209, I07249, A63954, A93445, I25027, I26929, I44515, I26928, I26930, I26927, I44516, Z96177, A93936, AR067731, AR067732, A60206, AR035224, A49045, A27169, X85060, AR016495, AR029418, I91969, A60212, A60209, A60210, A60211, A93446, I09267, I09270, I09268, I09269, I09252, I09251, A27170, A39929, A83151, A95117, AR068508,

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HCHAR16	89	675465	1 - 216	15 - 230		AA594128, A1625342, AW057569, and AA808529.
HCHAR43	90	715128	1 - 446	15 - 460		AA459445, C18242, AC003036, and Y12781.
HCHAR67	91	665184	1 - 306	15 - 320		A1816095, AW402653, AA827700, AW449023, and AW444910.
HCHBQ03	92	923763	1 - 490	15 - 504		AL039087, AL037259, A91754, A49700, AR031375, A58521, AR020969, A44171, I56772, I95540, A63067, A51047, A63064, A63072, AR068507, AR068506, AR000006, AR015960, AR031374, AR018924, AR000007, AR015961, AR051651, A94046, A94054, I58322, I58323, E12566, E12564, E12565, A18051, I01012, E02455, AR067785, A00782, A14595, A18755, I12245, A92666, A92668, A92667, A18050, I77211, AR007512, A80476, A80477, A02741, I25041, AR027319, A91752, A91751, AR027318, I56770, I56771, A25856, A92665, A38214, Z73334, E16475, Z73920, A49701, A95274, Z96705, A00223, A00224, I70974, A80474, A31896, I63070, I63071, I63072, AR066336, I21924, I44104, I44103, A06633, I85513, I46976, AR067733, AR027100, I58669, I25027, I26929, I44515, I26928, I26930, I26927, I44516, AR009152, AR009151, AR027099, I07209, I07249, A63954, AR029417, Z96177, A93936, AR067731, AR067732, A60206, AR035224, A49045, A27169, X85060, AR016495, AR029418, A93446, I91969, A60212, A60209, A60210, A60211, I09267, I09270, I09268, I09269, I09252, I09251, A27170, A39929, A83151, A95117, AR068508, AR068510, AR068509, AR054109, A48774, A29109, A32111, AR068550, A23373, AR068551, A48775, E01324, I08638, A94048, A94061, A70359, AR003585, AR038066, A83180, AR038321, AR038307, AR051652, X89399, AR067734, A64973, A83642, A83643, AR038320, AR038306, A32110, A93445, AR038762, E01239, E01561, AR064436, A92081, A92080, A92077, A92078, A92079, E01619, I06159, AR055048, AR055051, AR012640, and AR055049.
HCHML32	93	668518	1 - 535	15 - 549		Z59318.
HCHND96	94	880585	1 - 592	15 - 606		AA872500, A1026825, A1023522, AA769674, AA446298, AA446025, AA435968, AA719152, A1826656, AA928442, AL043981, AA300900, AL043982, AA948304, AA961187, D45701, N71729, A1557254, N71226, C14208, A1525796, A1541218, A1557264, D51378, A1535873, and A84916.
HCHOA76	95	740102	1 - 488	15 - 502		A1963720, AW193265, AL046409, A1305766, A1345654, AA490183, A1431303, AA581903, A1284640, A1613280, A1281881, AA610491, AL042853, AW303196, AW274349, A1696962, A1355206, AW301350, A1138265, A1334443, A1270117, A1350211, F36273, AW419262, A1799642, A1570261, AW062724, AW407632, A1679782, A1754658, AA584201, A1801482,

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HCHOD89	96	954866	1 - 202	15 - 216	
HCHPO55	97	717671	1 - 116	15 - 130	
HCHQB06	98	934941	1 - 490	15 - 504	
HCMSE07	99	927904	1 - 1366	15 - 1380	AI569831, AI798887, AI209013, and AW300115. AI681115, AI672348, AW173697, AI565451, AL079990, AW305215, AA115462, AA148788, AW081450, AW020072, AI088661, AI051834, AA243692, AA031780, N44611, AI610893, AI469307, AI094153, AA115214, AW130820, AI970462, AA233114, AI620951, N34679, AA115204, N69772, AA495921, AA987696, AA495922, AI079994, AI050072, AI434100, AW236674, AI770044, AA961227, AI115067, AI150297, AI039432, AI873440, AA938897, AI301357, AA603790, AA326653, AA910225, AA031879, AA377521, AI702644, AI913596, AA961701, AW452143, AI352693, AI381836, AI767254, AI247300, AA573940, AA081742, AI830541, AI493755, AI865675, R37287, AA937056, AI648373, AA653705, AI2666405, AW138034, Z41281, N85358, AI090946, N84377, AI612953, F08269, AI572322, T49708, AW103627, AA364595, D25919, T49717, T49709, AA094410, AA385800, AP000300, AP000113, and AP000045.
HCOMZ41	100	932878	1 - 347	15 - 361	AA863389, AI695443, AI969882, AC006512, U47924, and AA863395.
HCOOG04	101	925748	1 - 104	15 - 118	AI922923.
HCOOI07	102	951665	1 - 710	15 - 724	

HCOOM77	103	969161	1 - 502	15 - 516	AI913553, AI418464, AA299849, AA729782, AI547277, AC005005, and AC000403.
HCOOX10	104	961595	1 - 556	15 - 570	AI350354, AI904299, AI902503, D61534, T78554, AW183962, AI218626, AW304978,
HCOOZ11	105	965306	1 - 689	15 - 703	W74167, AI081779, AI0722238, and AI137499.
HCOPPI8	106	954332	1 - 651	15 - 665	T63995, and AI669879.
HCOQE11	107	965299	1 - 825	15 - 839	AI554514, AW117613, AA401269, AA894442, AI923609, AA968468, AA779787, W56250, AI049682, AI342711, AI277156, AA424469, AA443257, AW023482, AI978942, AI611714, AI132777, and AB024689.
HCOQH12	108	969151	1 - 551	15 - 565	AA683227, H65257, Z99396, AW392670, AW372827, AL119497, AL134531, U46341, AW384394, AL119457, AL119483, AL119418, AL119324, AL119522, AL119319, AW363220, AL119396, AL038837, AL119484, AL119391, U46350, AL119341, AL119443, U46349, AL037051, AL036725, U46351, AL119335, AL119363, AL119355, AL119496, AL036418, AA631969, U46347, AL043029, AL042989, AL119401, AL134920, AL134533, AL036924, AL042970, AL119488, AL119439, AL042965, AL134528, AI142139, AL042975, AL043033, AL119444, AL043011, AL037205, AL042614, AL036858, AL134538, AL042984, AL042544, AL042542, AL043019, U46346, AL043003, AL043037, AL042551, AL042896, AL042850, AL042995, U46345, AL037094, AL036268, AL036190, AL037639, AL036196, AL037526, AL037085, AL036998, AL037082, AL038447, AL037615, AL036733, AR066494, AR060234, A81671, AR023813, AB026436, AR064707, AR069079, and AR054110.
HCOQQ07	109	951658	1 - 424	15 - 438	AI678080, AW118890, AI962969, AI936455, AL037402, AA969064, AI127304, AI677882, AW195711, H19013, N33206, AI127565, AI332958, AI089991, AI253076, AW051831, AI025225, AI004194, AI873265, AW182432, N48995, AA528395, AI290549, AI003987, AA022465, AI377431, H81787, AA225942, N44742, H19307, W25684, AI246674, N95594, H81786, Z42919, R52370, H98158, AI382954, Z43457, AI244671, AI093458, AI042622, R52369, R73912, W20350, Z39530, AA022998, C04474, W92421, R74008, F02397, N92731, AA934795, AA502534, AW081759, H98461, AA744985, AA883984, AA319261, AI619688, AL079491, N45717, and AA662787.
HE8SG46	110	961388	1 - 2631	15 - 2645	AL043767, AA043579, and H42377.
HEAAA42	111	963100	1 - 260	15 - 274	AW452627, and AC009248.
HEAAB77	112	574510	1 - 348	15 - 362	AI910578.
HEAAK46	113	574232	1 - 259	15 - 273	
HEAAM16	114	574008	1 - 338	15 - 352	
HEAAM52	115	960579	1 - 427	15 - 441	
HEAAN18	116	932383	1 - 251	15 - 265	
HEAAQ66	117	653242	1 - 389	15 - 403	
HEAAT36	118	531348	1 - 476	15 - 490	R90939, H66735, and R89394.

HEAA760	119	733632	1 - 459	15 - 473	AL137566.
HEAAV10	120	968200	1 - 347	15 - 361	AL031178.
HEAAV33	121	574508	1 - 436	15 - 450	W79572.
HEDAE67	122	752875	1 - 133	15 - 147	
HEEAD64	123	741305	1 - 328	15 - 342	AI041541, and AC006116.
HEEAH07	124	851219	1 - 329	15 - 343	AI343204, R92902, AW138732, AC011331, AL137469, AB007899, Z84480, AP000228, AP000140, U95090, AP000078, AL050067, AC010168, AC004741, AC002426, AC005668, AL022164, AC005034, AD000685, AL035701, AC005307, AC005067, AC005572, AC003663, AC007056, AF099810, AC004472, AF061779, AL022399, AC000025, AC005527, AL022238, AC005529, AC005280, AP000088, AC007298, AC004964, AC002991, AL021026, AC002287, AF181449, AL008725, AL118516, AC006271, Z94044, and AL031985.
HEEAJ58	125	785121	1 - 340	15 - 354	AA206618, AA204795, W38480, AA431939, AA587180, and AF080470.
HEEAJ76	126	887321	1 - 535	15 - 549	AW088322, D80133, D80522, D80248, D80251, C14389, D51060, D81026, D59610, D51022, D80366, D80188, D59859, D51423, D80166, D59619, D80210, D51799, D80240, D58283, D80253, D80241, D81030, D80269, D50979, D80024, D80212, D80195, D80043, D80022, C14331, D80219, AW377671, D50995, D59467, D80391, D80164, D59275, D59787, D80227, D59502, D57483, D59889, D80196, AA305409, AA305578, D59927, C15076, D80038, D80193, C06015, D80045, C14014, D80378, D80268, D59373, AW177440, AA514186, AA514188, D80439, C14429, AW360811, AW178893, D80302, D59627, D80247, C75259, AW178983, T03269, AW375405, AW179328, AW378532, D80258, C05695, AW366296, AW360844, D58253, AW360817, D80132, AW375406, AW378534, AW178906, D51759, AW179332, AW177501, AW377672, D80157, AW176467, AW352171, AW377676, AW352170, AW178762, AW378528, D51250, T11417, AW176467, AW352171, AW179019, AW179024, AW360834, AW177731, AW178775, AW178907, AW369651, AW179019, AW179020, D59653, AW367967, AW352158, AW177505, AW360841, AW352117, AW179020, D59653, AW178909, AW177456, AW179329, D59503, AW178980, AW178914, AW177733, AW178908, AW178754, AW179018, T48593, D51213, D81111, D80064, AW378525, D51079, AW179004, AW178774, C14227, D45260, AW179012, AW352120, AW352163, T02974, AI910186, AW352174, AW378543, AW179009, AI905856, H67854, C14407, AW177728, AW178911, AW378540, AW177722, D58246, F13647, D51221, AW367950, H67866, AA514184, C03092, AW177508, AA809122, AW178781, Z21582, D80228, AI525923, AW177497, AI535850, D60010, AI525917, D80014, AI557774, AW178986, D59474, T03116, C14957, C14298, AW177723, AW179011, D59317, AW378533, C14973, D58101, D45273, AW378539, AI525920, C14344, T03048, D50981, AI525235, AI557751, AW177734, D80168, AI525227, AI535959, AI535686, AA285331, D59551, AI525912, D51097, C14046, D60214, AI535961, D52291, AI525215, D80949, AW378542, AI525242, AI525925, AI525222, D59695,

HEEAK22	127	673904	1 - 312	15 - 326	C16955, C05763, Z33452, AW360855, H67858, A1525237, D51053, C04682, Z30160, T02868, A62298, AR018138, AR008278, AJ132110, A84916, A62300, AF058696, AB028859, A82595, X67155, Y17188, D26022, A25909, AR060385, Y12724, A67220, D89785, A78862, D34614, AB002449, A94995, D88547, AR008443, I50126, I50132, I50128, I50133, AR066488, X82626, AR016514, AR060138, A45456, A26615, AR052274, AR016808, Y09669, A43192, A43190, AR038669, AR025207, AR066487, A30438, I14842, AR054175, D50010, AR066490, Y17187, I18367, AR008277, AR008281, A63261, A70867, AR008408, AR062872, AR016691, AR016690, U46128, AB012117, D13509, A64136, A68321, AR060133, X68127, I79511, A85396, D88507, AR066482, A44171, A85477, I19525, A86792, X93549, U79457, AF123263, AR032065, and AR008382.
HEEAK84	128	780838	1 - 293	15 - 307	AC004549.
HEEAL31	129	887312	1 - 333	15 - 347	AL137566.
HEEAN24	130	676721	1 - 335	15 - 349	
HEEAS58	131	735620	1 - 496	15 - 510	
HEEAU79	132	706935	1 - 430	15 - 444	
HEEAW01	133	851213	1 - 372	15 - 386	H64999, and AC011311. AA368329, A1281622, AA935827, AA581317, A1350189, AW177224, A1859906, A1039257, AA385094, H29593, F35789, A1267450, A1267356, A1245693, AA493533, A1668566, AA364199, AL039515, AW151848, A1733523, A1732911, A1336771, AA614647, A1338575, AA354695, H48017, R70883, AA736713, A1249688, A1982994, AA197089, AA496941, A1671077, AL040360, AA834798, A1038304, AW023975, AA354677, A1003391, A1754567, A1569100, AW192599, A1754105, A1755214, R70884, AA351893, A1080307, F23268, AA813203, AA456149, AA525332, AA557945, AA077637, AA533660, N55076, AW301855, AA504951, A1342863, H65213, A1459879, AW089395, AA155817, AA363311, A1270280, A1624038, H43183, A1905494, A1859744, W61253, A1791227, AL041681, AL041682, AA847341, AA522864, AA601378, AA077247, T10579, AL047645, AA579082, W69639, AA878492, AA132445, A1791659, AW303822, T07013, W28786, AA715508, AA126475, A1690520, AW167202, A1114645, A1370470, AA664924, A1884404, AA678616, AL039761, AW265688, AA653291, AW026282, M78137, AA598605, A1749306, AA524846, H94979, AA809104, A1821945, M77964, AA584525, A1468993, A1285651, A1708108, A1207534, AA449468, AA831801, H96919, F00937, AA745628, A1018726, AA467740, AW265484, A1016192, AA133293, AA825954, A1734119, Z94054, L78833, AC004447, AC008044, AC006210, AL121748, AC005678, AC005537, AC005828, AP000255, AC004158, AL132987, AP000135, U91321, AP000031, U96409, AL133241, AC007371, AC006211, AL049781, Z99291, AL031291, AL031685, AC005527, AC005632, AL137100, AP000558, Z82208, AC005074, AC005412, AC005180, AC002990, AC005529, Z82193, AF002223, AC004383,

AC004673, AF095725, AF196969, AC005015, AL023574, AL008718, AJ251973, AC007687, AC005599, AC006121, AP000502, AC006120, AC005695, U91325, AC006487, AL031848, AL035455, AC003108, AL049776, AL049699, AC004417, AL022165, AC005696, AC009516, AF052041, Z69721, AC002492, AL022316, AL035684, AC007686, AL139054, AC003663, AC006511, AC002045, AC004815, AL031053, AC004230, AC006111, AC004834, AF205588, AC004486, AC005089, AC004870, AF217403, Z68331, AC007387, AC004655, AL031657, AC002395, AC005325, AL031287, AC005746, Z93024, AL035588, AC007096, AC004098, AL117338, AC004687, AC002301, AC002288, AP000094, AC005300, AC005231, AC007207, AP000010, AC003037, AP000555, AF030453, AC000049, AC009275, AC008154, AC006071, Y18000, AL035587, AC019014, AC006204, AC004682, AC005808, AC002430, AC005088, AC006948, AF053356, AL020996, AC000111, AC005971, AC005184, AC002302, AP000213, AP000305, AC006312, AL031432, AC005261, AL049760, AC007384, AC004854, Z98051, AC007563, AC005324, AB016897, AL121580, AC005280, AC006079, AC009399, AC007238, AC007676, AL034423, AC005606, AC007435, Z98745, AC004771, D87012, AP000047, Z98742, AL050307, AC007367, AC006023, AP000355, AC004263, AL049780, AC003025, AL096757, AL049872, AL031767, AC005821, AC005751, AC004890, AC005914, AL118497, AC004760, AC005856, AC004900, AL031659, AC002072, AL035706, AC005874, AF134471, Z84497, AC004242, AC004542, AC005694, AC005747, AL031680, AL031311, AC004081, AC006020, AL008630, AF001549, AL031295, AC006017, AL133500, M92069, AF139813, AC005081, AC008282, K03431, AL031984, M69197, AP000115, AP000692, AC004686, AC005544, AP000030, AL020997, AL033527, AC007666, AC007240, AC009028, AF200465, AF196779, AC004004, AC004883, U82668, AC006254, AC002350, AC006088, Z70224, U95742, AC006455, Z97055, AC004762, AF126403, AD000833, AL049591, AP000152, AC004106, AL033397, AL031588, AC006132, AL034553, AC005722, AC004099, AC002299, AL022398, AL009179, AC003013, AC004975, AL049761, AC004228, AC005702, AL109963, AC007277, Z82176, AL021368, Z95115, AC008056, AC005399, AC004882, Z95116, AC007216, AC004812, AC004491, and AC005519.					
HEEAW13	134	656299	1 - 357	15 - 371	AC005344.
HEGAA24	135	676716	1 - 407	15 - 421	AC005324.
HEGAA73	136	767284	1 - 411	15 - 425	
HEGAB84	137	823900	1 - 339	15 - 353	AI222155, and AC007040.
HEGAC69	138	754344	1 - 600	15 - 614	W21047, and AW364581.
HEGAC95	139	965183	1 - 584	15 - 598	AW275380, AW273693, AA102550, AI589713, AA515679, AA931215, AA069905, AA661692, AI361672, AI500209, AA025822, AA447097, AI249434, AA833996, AI086891, AA342066, R41926, AI005214, AI376215, AA992138, R37636, AW129954, AA039651, AI986034, AI358677, R39054, AA428629, AI274337, AI352529, AI768472, T78443, AI125818.

HEGA182	140	955291	1 - 594	15 - 608	AA977410, T91051, A1828094, A1675983, AW248442, and A1681656.
HEGA004	141	887299	1 - 502	15 - 516	A1624142, AW393412, M62051, A1870044, AA330088, and AB014538.
HEGA083	142	780837	1 - 314	15 - 328	AA707670.
HEGA006	143	934705	1 - 636	15 - 650	AR064011.
HEGAP31	144	697419	1 - 454	15 - 468	A1813699, AW051520, A1312608, A1338779, A1369324, A1218925, R72618, R80387, R72688, R80493, AA928026, R63885, A1298652, R63884, and A1214650.
HEGAP36	145	706951	1 - 536	15 - 550	U73167, and U90094.
HEGAR53	146	719387	1 - 669	15 - 683	H83841, AA019657, and A1127286.
HEGAY32	147	699906	1 - 182	15 - 196	R55547, H12557, H27260, H00825, R23780, AA747653, H12800, T50030, H42368, and AW361580.
HEGAY52	148	726316	1 - 190	15 - 204	AL137660.
HEGAZ61	149	950033	1 - 547	15 - 561	X66139, and X66140.
HEPAA44	150	509456	1 - 313	15 - 327	AA335025, and AA335496.
HEPAB70	151	557149	1 - 341	15 - 355	
HEPAD09	152	888726	1 - 268	15 - 282	AA335537, AA336174, AA335376, AW406878, A1541216, A1525220, A1525710, and AL022318.
HEPAD40	153	509002	1 - 254	15 - 268	AA335399, and AA335663.
HEPAD82	154	509452	1 - 185	15 - 199	AA335412, AA335243, AA335606, and AA507007.
HEPAJ70	155	586843	1 - 61	15 - 75	AA335523, and AA335948.
HEPAK01	156	518331	1 - 297	15 - 311	AA335526, and AA347833.
HEPAK41	157	925146	1 - 571	15 - 585	AA524859, A1366999, AW274554, AW085032, AA897153, AA335550, AA405462, and AW305246.
HEPAM29	158	508706	1 - 389	15 - 403	AA335591, and AA335639.
HEPAN19	159	508694	1 - 395	15 - 409	AA335593, A1247347, AA335892, A1700468, A1014987, AA629210, A1700878, and X66139.
HEPA002	160	926914	1 - 351	15 - 365	T31859, A1452722, A1810976, AA039492, AW166142, T34621, AA887990, AA526699, A1491944, A1291744, AA971270, A1291429, A1147212, A1191377, A1282167, AW194181, A1382209, A1819092, A1125991, A1291350, AA635803, A1076763, A1025483, AW054812, AW026209, A1872247, AA446939, AA393844, AA595299, AA588205, AA635837, AA580350, W42714, AA652370, A1205639, A1346541, A1299347, AA618584, AA041546, A1190326, A1589781, A1038728, AA747482, A1374991, A1186987, A1272049, AA968514, AA781105, AA719399, A1745517, A1479431, AW005070, A1760672, A1828575, A1653887, A1983727, A1950052, A1681964, AA953968, R60201, AW001576, R43919, A1568018, A1445351, R88422, H14119, A1588901, T67080, H20066, Z38557, AA069378, N95318, H19689, R88071, AA069325, AW340398, AA532555, AA742707, A1095816, A1261987, T31864, AA224332,

						AI089055, AI192912, T2995, AI690936, AA490233, AA425662, AW178914, H52718, AW178908, AI198749, AI277302, AW178907, N75536, AW178911, AI336808, AW178912, AW050516, N91860, AW178906, AI354778, H19688, AI925482, T31898, AA308975, AA393826, H19728, AW439026, AA362297, AA308974, AA427787, AW178913, AA375056, AI028636, AI281040, AI955663, AA350360, AI372759, AA328758, AA223799, W23910, R88070, AA536032, U79457, and AC005041.
HEPA12	161	968771	1 - 298	15 - 312		AI01447, and E00237.
HEPAS44	162	884083	1 - 371	15 - 385		AA335822, AA335497, AA605142, AA493490, and AC005042.
HEPBA39	163	919875	1 - 696	15 - 710		AW291560, AA335715, AA897741, and AI559166.
HEPBB24	164	508684	1 - 206	15 - 220		AA335914, AA335921, and AA335993.
HEPBB60	165	855597	1 - 351	15 - 365		AA335668, AA336011, AA335983, and AA335973.
HEPBG26	166	967921	1 - 344	15 - 358		AA336199.
HEPBG35	167	508686	1 - 221	15 - 235		AA335799, AA336205, and AA653622.
HEPBH28	168	508673	1 - 390	15 - 404		AI208794, AA336191, AA150459, AI620599, and AC003090.
HEPBH38	169	707524	1 - 325	15 - 339		AA335435, AI078409, AA384480, AI635196, AI445373, AA515224, AA363957, AA551548, AI793032, AF053356, AF111167, AC006511, AC004106, AP000044, AP000112, AF001549, D00596, AC005531, AL080241, AC002310, AL049694, AC005043, AL049643, AL034421, AC002350, AL022334, AL133243, AC004770, AC009225, AC005231, AC005031, AC004134, AP000475, U80017, AL049569, Z82206, AC004000, AC007358, AC002400, AB002325, AC005618, AC005730, AL049745, AF176815, D88268, AC005632, AC006137, AC002126, AD000812, Z82190, AL035460, AC004223, AC002477, AE050318, AC005071, AC004692, AC004531, AF060568, AC007055, AF015262, AI229043, AC005261, AL022322, AC004675, AL133245, AC001228, Z93023, AC005529, AL121973, AF134726, AC006965, AC006285, AL008718, Z49236, Z99943, AL035086, and Z93930.
HEPBH45	170	508696	1 - 312	15 - 326		AA336047, and AA335600.
HEPBO69	171	888697	1 - 335	15 - 349		AA335535, AA335244, AA335394, and AC004464.
HEPBQ47	172	713836	1 - 327	15 - 341		AA336176, AW204786, AI094626, AW246712, AI935606, and H92959.
HEPBQ69	173	888693	1 - 448	15 - 462		AA335278.
HEPBS10	174	968665	1 - 391	15 - 405		
HEPBX43	175	715685	1 - 431	15 - 445		AI827693.
HEPCD36	176	523670	1 - 285	15 - 299		AW372642, AI763257, AI828957, AW206245, and AW237541.
HEPCE25	177	529343	1 - 202	15 - 216		AL034548.
HEPCO59	178	761094	1 - 150	15 - 164		AI198719, AI381368, AI695853, AI620570, AA564802, and AA456099.
HEPCT32	179	947081	1 - 843	15 - 857		AA913839, AA429491, AA428554, AA724454, AA868848, AA336014, AI190145, and AI125345.

HEPCU32	180	931824	1 - 1512	15 - 1526	H83516.
HEQAE65	181	911438	1 - 148	15 - 162	AL044222, AJ007558, AB018334, and AF165926.
HEQAH70	182	699690	1 - 344	15 - 358	AL046469, AI962060, AF053944, AC006454, E07353, and AF053943.
HEQAO76	183	769973	1 - 422	15 - 436	T85314, AI360684, T91254, T85528, and T87321.
HEQAZ52	184	727051	1 - 745	15 - 759	AL039872.
HEQBA41	185	712243	1 - 685	15 - 699	AA336507, AA336418, AP001042, AP001043, and AF017257.
HETAD29	186	509311	1 - 254	15 - 268	AA338023, AA336535, and AC002357.
HETAF20	187	509308	1 - 331	15 - 345	R10452, R02534, AA336773, AA336549, R00052, AA704817, AA678320, and AI248957.
HETAF49	188	509306	1 - 500	15 - 514	AA336405, AW248106, H24100, AW247283, AF161459, and AL110193.
HETAF89	189	509300	1 - 234	15 - 248	AA337683, AA336632, AA157672, AA157671, W32894, AA339882, AA706316, AA385464, AA873028, AI961281, AW177658, and AD001502.
HETAH16	190	942612	1 - 335	15 - 349	AA336517, AA336751, AA337580, AA336640, AA337190, AA336988, and AC005858.
HETAH66	191	799665	1 - 352	15 - 366	AA336641, AA337920, and AA336746.
HETAH67	192	535390	1 - 304	15 - 318	AA337221, and AA336756.
HETAJ26	193	508994	1 - 241	15 - 255	AA336844, AA442492, AA394009, AI061614, AW327292, W76580, AA337096, N39773, AA287514, AA022944, AA355038, W16809, AA306378, W16892, W20041, AI038286, AA902825, AA431265, AI128035, AA437055, AA442618, H69650, AA333960, W16816, AA471293, AA429690, N39663, T81379, N42264, AW298810, AI582147, N95146, N28024, AA806403, AA181314, AA092603, N24270, N25823, AI206546, AI347368, AI093178, N26593, AI290898, AA676717, W16976, AA758626, AA846456, AA838697, N57221, N40080, AA927961, AA769954, AA729656, AA962149, AW118695, AA435600, AI187055, AI348195, AI223403, AA939313, AA282421, AA659796, AA640163, AI207323, AA436689, AA436861, AA437321, AA767427, AA807555, AW168756, N66030, H80473, N89586, H59458, AI292018, AW151976, D62144, AI887826, AI097028, N30575, AA831986, N89608, AA187056, N56324, AW137724, N27143, AA043993, AA740443, H98703, AA834618, AI269239, AA586548, AI393728, AA022974, AA989305, AA782538, AA287386, AA769511, AA255992, N26891, N67380, AI570699, H70497, H70481, and N89574.
HETAN20	195	535359	1 - 345	15 - 359	AA336957, AA336982, and AA336981.
HETAP59	196	509118	1 - 291	15 - 305	AA336978, AA337032, AA337033, AA279029, and AL133312.
HETAP94	197	960392	1 - 307	15 - 321	AA336825, AA337256, AA337682, and AA337525.
HETAR06	198	960839	1 - 301	15 - 315	AA337121.
HETAR60	199	934444	1 - 296	15 - 310	AA337135, AI376239, AW405016, AW392584, AA782301, AL047643, AI061313, AA741301, AI557271, AA364567, AA412065, AL078581, AC004024, Z93023, AC004841, AC004991, AC004019, AP000555, AC005288, AC002094, Z83820, AC006538, AL049557, AC000085,

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HETAT83	200	918730	1 - 797		15 - 811	AA337275.
HETAZ13	201	536192	1 - 313		15 - 327	AA337464, and AA298457.
HETBA01	202	509189	1 - 225		15 - 239	AA337530.
HETBF45	203	508655	1 - 318		15 - 332	AA337559.
HETBH48	204	720853	1 - 298		15 - 312	AA337853.
HETBR25	205	509099	1 - 482		15 - 496	R87344, AA338031, and AW155642.
HETBW39	206	523046	1 - 334		15 - 348	
HETCE12	207	971505	1 - 674		15 - 688	
HETCE55	208	508666	1 - 444		15 - 458	AA878439, AA337500, R11423, R05601, AA337219, AW373556, and AC005876.
HETCG63	209	841924	1 - 1765		15 - 1779	AA336411, AA319330, AA337238, AA337599, AA337742, A1709289, W24609, AA308045, A1659881, A1803103, AW236950, AA336555, AW242783, AA630205, AA516061, AA337527, AA336474, AA782919, AL021878, AC005630, AL078475, AC006023, AL133371, AJ239329, AC007204, AC005574, AC005908, AC002485, AC004055, Z83820, AC004074, AL031432, AC006539, and AC004381.
HETCH92	210	921390	1 - 244		15 - 258	AA337969.
HETCL55	211	522829	1 - 406		15 - 420	AW301200, and A1057175.
HETDA81	212	525412	1 - 425		15 - 439	A1347829, A1539038, AA164850, A1862333, A1208103, T91042, W87820, AW103512, AA164851, A1538025, T83877, A1557283, A1673742, AA827331, A1565180, A1827139, A1590154, AA780419, AA551005, A1022058, A1886882, A1963604, AA164745, AC006047, AP000509, AC009542, AC009330, D84394, AL080317, Z97876, Z98750, AC004185, AC005023, and AF058907.
HETDD18	213	509110	1 - 425		15 - 439	AA337063, and AB020858.
HETDE67	214	883018	1 - 352		15 - 366	
HETDE86	215	855509	1 - 384		15 - 398	AA337665, A1818119, AA337827, H55651, AC002051, AC002054, AC007664, AC008018, and AP000550.
HETDG67	216	960870	1 - 645		15 - 659	AA337226, AA336474, AA460382, F35658, F28539, AA634465, A1963222, A1674747, AA337527, AA336555, AA336411, and A1709289.
HETDI03	217	925489	1 - 145		15 - 159	AL049650.
HETDL92	218	508990	1 - 260		15 - 274	AA337546.
HETDN90	219	695021	1 - 257		15 - 271	
HETDP21	220	525407	1 - 281		15 - 295	

HEIDT15	221	660714	1 - 788	15 - 802	N99226, N50058, A1709289, N66257, A1333306, AA999709, R16250, A1218967, A1201148, A1754092, AC004150, AC006539, AC007204, AC006024, U82672, AC005592, and AC004381, AA337353.
HETDW59	222	827093	1 - 278	15 - 292	
HETEB68	223	917400	1 - 257	15 - 271	
HETEQ16	224	952297	1 - 259	15 - 273	
HETEZ43	225	529591	1 - 347	15 - 361	AL034400, and AF030186.
HETFA40	226	523112	1 - 464	15 - 478	AL021920.
HETFC82	227	799658	1 - 530	15 - 544	AL121162, A1684248, AW371221, AW371225, AW371199, AW371191, AW371187, AL035291, AJ250075, Z96050, and AF097535.
HETFE48	228	974351	1 - 696	15 - 710	AL035982, A1564005, AW074802, AC006062, AC007461, AL031223, AF074903, Z86064, AC005189, AL022159, AC006369, AC004787, AL049831, AL122007, AC006101, AF001552, AL109653, U73642, AC003002, AC006265, AC006972, AC002990, AC006305, AC006354, AC007486, AL008633, AC004382, AC005799, and AL031666.
HETFG29	229	795274	1 - 958	15 - 972	AL045331.
HETFI24	230	954104	1 - 1193	15 - 1207	AL687645, AL046701, AL041179, and AB011137.
HETFI81	231	523398	1 - 349	15 - 363	
HETFL39	232	973697	1 - 532	15 - 546	
HETFM43	233	973702	1 - 399	15 - 413	N71545, AA019707, AW301855, A1560119, AA456149, AA503144, A1749306, AA056206, AA747375, A1125615, AL110391, T47613, AA826144, AA843450, AA828851, H94871, AW085794, A1890857, AA488111, AA284179, AA747480, AA077637, AA173334, AA747276, AL096775, AC005722, Z99716, U85195, AE000658, AC005037, AL135744, AC004973, AF001548, AL008716, U15422, AL022326, U91321, AC004595, AF196779, AC005921, AC005514, AL031687, AC006441, AL021391, AC007227, AL035588, AC008080, AL132992, AC000070, AC005778, AC005409, AC004878, AL050312, AC005600, Z81369, AL139054, AC002364, AC009247, AC006390, AC000082, AL021154, AP000512, AL035417, AL079295, AL031670, AL096712, AC005829, AC007021, AC004953, AC004890, AC002115, U89337, AC005320, AC005043, AL109984, AC006449, AC002090, AC006211, Z83844, AL135960, AJ131016, AC005996, Z82194, AC004797, AL009179, AL034400, AC007243, D26535, Z69709, Z81367, AC007207, Z99916, AC004517, AC005772, AL121578, AC006146, AC005940, AL078638, AP000692, Z97630, AL035086, AC002565, AC006511, AC002996, AC005191, AL034429, AC007436, AC004134, AC006530, AC002525, AL049830, AC005049, Z82198, AL021407, AL031774, AL049611, U95740, AL031005, AC005094, AL008719, AF053356, AC004913, AF052684, AC004955, AP001054, U78027, AL020995, AC005200, AL034420, AL050318, AL035460, AC006001, AL080243, AL031848, AC005104, AC006581, AC006536, AC002477, AC003047, AC009263, AC006116, AC007790, AL049557, AC007057, AC003982, D00591, AC006017, AF111167, AC004707, D89927, AP001052, AL133485.

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HETGH30	234	527929	1 - 114	15 - 128	AC007655.
HETGI40	235	503383	1 - 51	15 - 65	
HETGL62	236	523372	1 - 316	15 - 330	AA857229, and AW207714.
HETGL74	237	947978	1 - 598	15 - 612	R30743.
HETGN20	238	927789	1 - 748	15 - 762	AA524918, AA524934, AW177242, AW177240, AW177241, AW177236, AW177243, AW177239, AI380737, and AW176018.
HETGQ76	239	542486	1 - 177	15 - 191	
HETGS09	240	969632	1 - 160	15 - 174	
HETHD30	241	935175	1 - 521	15 - 535	AA333629, AA380902, AA172147, Z55371, Z60082, Z57905, and AL023755.
HETHS6	242	974348	1 - 245	15 - 259	
HETHH49	243	967737	1 - 627	15 - 641	
HETHO63	244	745503	1 - 585	15 - 599	H85494.
HETHO78	245	963592	1 - 648	15 - 662	U59298.
HETHR24	246	851412	1 - 448	15 - 462	AA296378, and AA298030.
HETHT53	247	974555	1 - 427	15 - 441	Z69905, and AL049750.
HETIF01	248	966185	1 - 209	15 - 223	AA585101, D57491, Z28355, AA585155, AA585476, AI546999, AA585098, D61254, AI541365, R29445, C16300, C16305, AI525556, AI541374, AA585439, T11028, Z30131, AI546875, AI525316, AI526184, AI546945, D55233, AI525431, AI547039, AI557262, AI541523, AI526140, AI557731, R28735, AI541205, AI541535, R29218, AI540967, D57186, AI536138, AI525306, AI526194, AI557734, D61185, D53447, AI535660, AI557727, AI557787, AI535639, R45895, AI557740, AI541307, AA585336, AI557807, AI546891, AI541013, Z32822, AA283326, AA170832, AI525320, AI526073, AA585329, AI557084, AI526176, C16293, R28892, T41289, AI557763, AA585453, R28895, AI557799, D53161, R28965, R29177, D60765, AI556967, C16292, C14723, R28967, AI526187, AI541514, AI546828, D59751, AI546996, C15069, AI541510, AI526113, D54897, T18597, AI541508, AA174170, AI546855, AI541534,

D60844, AI541517, AI541346, AI547250, AI526180, AI557808, C15120, AI525339, AI525328, AI541527, AI557238, AI557796, AI541415, AI541390, AI540974, C15406, AI525856, AL044162, AL041086, AL043496, AL041296, AL041233, AL043444, AL044529, AL044125, C14391, AA585325, AI541017, AL040193, AJ239433, AI541533, T41329, AI546829, AL041324, AL043538, AL040621, AL041347, AL041098, AL041163, AL041277, AL041358, AL041096, AL047012, AL040464, AL041346, AL040155, AL041197, AL043612, AI557602, AL039915, AL040463, AL047219, AL041227, AL047057, AL047170, AL040119, AL047036, AL041292, AL041051, AL047183, AL040322, AL041131, AL046330, AL041278, AL041133, AL041159, AL041238, AL041142, AL045817, AL040625, AL040510, AL043467, AL044186, AL044037, AL040091, AL040128, AL040168, AL040255, AL040285, AL040342, AI557533, AL040332, AL040617, AL045684, AI540882, AL040745, AL040370, AL043677, AL040529, AL046442, AL040839, AL041752, AL041168, AL043775, AL044165, AL043492, AL041602, AL045920, AL037436, AL038838, AL044074, AL041635, AL045990, AL040458, AL044199, AL044187, AI557279, AL040090, AL040263, AL040294, AL040329, AL040082, AL044272, AL040444, AL041186, AL040148, AL041730, AL041523, AL043627, AL079878, AL046392, AL041374, AL040052, AL043845, AL039338, AL042135, AL044064, AL038983, AL039316, AL043923, AL043814, AL043848, AL037435, AL041459, AL043570, AL041577, AL044201, AL044258, AL046850, AL038532, AL040768, AL037727, AL046994, AL040414, AL040571, AL046914, AI142134, AL043537, AI546831, AL041140, T23985, D59436, AI557408, AL045725, AL040238, AA585378, AL039744, AA585434, AL040253, AI557864, AI541356, AR062871, A25909, AR038855, Y09813, A85395, A85476, AR037157, AJ244005, Y16359, D50010, AF082186, AJ244004, AR062872, AR062873, D78345, U94592, A20702, AR017907, A20700, AJ244003, A43189, A43188, AR038762, AJ244007, Z32836, A70872, A70869, A98420, A98423, A98432, A98436, A98417, A98427, A98767, A93963, A93964, I63120, I44681, X83865, A84772, D13509, A84776, A84773, A84775, X81969, A84774, AR054109, AR067731, AR067732, A86792, A58522, A91750, AR008429, I13349, A60212, A60209, A60210, A60211, I18895, I05558, A18053, AB025273, I08396, I08389, I84553, I84554, I15717, I15718, E03627, I48927, A90655, D13316, A02712, A77094, A77095, A81878, A95051, I06859, A18050, A23334, A75888, I70384, A64973, A60111, A23633, AR007512, AR031566, A35536, A35537, A02135, A02136, A04663, A04664, AR038066, I00682, A11623, A11624, E00609, E13740, A11178, E01007, A10361, AR043601, M28262, A11245, I03331, A02710, E12615, AR035193, A92133, E14304, A07700, A13392, A13393, I62368, AR031488, I13521, I52048, A27396, AR027100, I49890, I44531, I28266, I21869, A91965, I44516, A70040, E16678, A82653, E16636, A93016, AF149828, A24783, A24782, A95117, A58524, A58523, I08395, AC005913, I19525, I01995, I25027, I26929, I44515, I26928, I26930, I26927, I08051, I60241, I60242, AR051957, A20699, E00696, E00697, E03813, I66482, AR009151, I66485, I66483,					
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HETIG71	249	974359	1 - 397		15 - 411	
HETIJ84	250	766589	1 - 386		15 - 400	AA359333, H80204, T81361, W39405, W26521, AL037788, AI340563, AA831054, AI942228, AW025654, AI656682, AI867892, AI392798, H78428, AI431922, AI935355, N74643, AA470851, AI984946, AA136269, H58033, R24652, W25612, N88059, and AF161432.
HETIJ85	251	883991	1 - 270		15 - 284	AA336474, AA336555, AA634465, AI963222, AI674747, and AA337527.
HETIQ89	252	764951	1 - 367		15 - 381	AA732024.
HETIU60	253	739804	1 - 632		15 - 646	
HETIY84	254	935947	1 - 152		15 - 166	AW410053.
HETJD30	255	974558	1 - 651		15 - 665	
HETJD86	256	909130	1 - 637		15 - 651	AA283174, AA813107, N85059, AI829548, H66598, H47422, AI025850, AW193437, AL049869, AB023214, AC004230, AL133163, AL024498, AC006006, AC005393, AL031722, AC009516, AP000557, AC004463, AC002316, AL030995, AC004799, AC004876, AC005696, Z93023, and AC005015.
HETJG63	257	950017	1 - 480		15 - 494	
HETIJ32	258	806435	1 - 600		15 - 614	R02503, AA873257, AI791771, AL021997, and AC005678.
HETJK67	259	751072	1 - 491		15 - 505	
HETJN51	260	767932	1 - 544		15 - 558	
HETJT95	261	789310	1 - 401		15 - 415	AA528140, AI375677, AW237773, AI624970, AI420574, AI244780, and AI624952.
HETJX04	262	927120	1 - 848		15 - 862	AA853282, AA370481, AA625156, AB025258, and AB025259.
HETJY11	263	966194	1 - 603		15 - 617	AA356376, AI354409, AA610255, AA577824, AA158549, AL120004, AW265688, AI583532, AW265276, AI049630, AA701122, AI801505, AI283938, AI243793, AW403829, AA491423, AI417469, W96277, AI565084, AI358776, AA626840, AA558404, AA502110, AW089625, AI133514, AI733856, T47138, AW268329, AW275432, AA551067, AI049845, AI421257, AA834816, AI061303, AI687972, AA297789, F31811, R70883, AL041375, AI912401, AA133293, AI090334, AI538404, AI336771, AA632556, AW069227, AA176605, AA612727, AA102737, AI252726, H95865, AI623364, AA484022, AI255083, AI634187, AW008184, H29914, AA599532, AI369076, AA525331, AA582746, AL040430, H67064, AI671077,

AW068580, AA020873, AW243945, AA515924, AI355246, AA557945, AA513851, AI473995, AA493789, AA581471, AA485343, AA609826, AA846923, AA018923, AW167202, AW341955, AA608675, AA630854, AI567391, H43771, AI054030, AA376358, AW238341, AW237905, AI932871, AI457313, AA218684, D44672, AW129188, AA084320, AI474127, AA444166, AI431513, T15767, AW341978, AI469564, AA610433, AI520925, H01243, AA831426, AI309943, AA491767, AA302982, AI049701, AW270385, AA182731, AA551035, F35674, AA910941, AI720403, AI570237, AI610468, H61742, N33587, AI358928, AA489856, AI073373, F00533, AA857812, AI125143, AW236219, AA501782, AI282724, AA666295, AI869797, AI246386, AI816058, AC005015, AC002350, AC005839, AC002470, AC006512, AF001550, AI133246, AL009031, AC002326, AC007225, AF064861, AC003041, AL049766, AC002126, AC005874, AF134471, AC006277, AL109628, AC006312, Z99943, AC005089, AC005736, AC006160, AC003037, AC009044, AP000501, AF205588, AC008372, AC005067, AC004526, Z84487, AC006050, AC005920, AC007057, AP000252, AL132712, AP000212, AP000134, AP000704, AF047825, AL031584, AC006449, AC005779, Z83846, AL022163, AC006059, AC002351, AC003104, AL050318, AC004531, L14561, AC005531, Z95331, Z98050, AC005529, AC002128, AL135744, AC004230, AC007488, AC005722, AL034549, AC007546, AC006501, AC004983, AC007878, AL049829, AC000004, AC006459, AC004755, AC006285, AC009509, AC005527, AC006130, AL035587, AC006480, AL031729, U91323, AC004686, AC005765, AC004106, AC006084, AC007226, AC004820, AC004491, AC004019, AL031003, AC004865, AL034420, AC002045, L44140, AL031228, AL109758, AC006380, AF111170, AL031311, AP001053, AC006529, AC007193, AC006581, AC003689, U95090, AC004895, AC005081, AL031258, AC008040, AC003071, AP000321, AL035684, AC006023, AC004985, AL078463, AL034417, AC006211, AC006071, AL021920, AC007308, AC006252, AC004813, AL096712, AL096701, Z99128, Z83844, AC006946, AC005593, AC006165, AC005300, AL031005, AC005197, AC016025, AL132987, AC007114, AC007899, AB023051, AC007050, AC000082, AC003982, AC005914, AC007695, AL031685, AP000121, AP000167, AP000052, AC004125, AC020663, AL121825, AC006571, AP000952, AL133245, AF067844, AC003963, AP000512, AL031597, AC005829, AL049760, AC005696, AF196779, AC005006, AF207550, AF157816, AC016027, AC004448, AC004408, AC006064, AC005803, AC005523, AC007637, AC016830, AC002404, AC006121, AC004000, AL031681, AL009181, AL049776, AC005057, AL034582, AC007277, AC005755, AC008149, AL031681, AL009181, AL049776, AL023879, AC004596, AC002312, AC005071, Z98946, Z95115, AF134726, AL096791, AC002425, AC005086, AC004955, AF001549, AL121603, AL117337, AL021453, Z68870, AL080243, AC004973, AL117258, Z97989, L78810, AC005900, AC004695, AL117694, AC007151, AP000689, AL023807, Z98941, AL109798, AL022476, AP000152, Z82206, AB020868, AL049839, AC007279, AC005037, AC007686, AC004771, AJ003147, AC004878,					
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HETKA38	264	894600	1 - 649			AC004933, AL020997, Z95116, AL035423, AC006132, Y18000, AC004655, AP000356, AC002476, AF165926, AC005972, AC003108, AF053356, AJ746003, AC004967, AL049712, AC007684, AP000115, AC007649, AC003962, AC003950, AP000694, AL031588, AC005377, AL049636, AC005004, AC002991, and AA910844.
HETKG67	265	974355	1 - 718		15 - 663	AI799104, AA972394, and R07977.
HETKH01	266	915320	1 - 302		15 - 732	AW084172.
HETKH92	267	790910	1 - 198		15 - 316	
HETKM55	268	974362	1 - 730		15 - 212	AR062277.
HETKQ65	269	855449	1 - 474		15 - 744	
HETKV26	270	910030	1 - 680		15 - 488	AA336548, AJ251025, AC002098, and AJ251029.
HETKX91	271	789797	1 - 307		15 - 694	AC003665.
HETKZ65	272	941045	1 - 608		15 - 321	
HETLB04	273	920894	1 - 1373		15 - 622	AA312013, and AF067972.
					15 - 1387	AA702803, AI803643, AI566865, AA766437, AW005007, AA043795, AA683129, AI817677, AA512883, AA505838, AA631295, AA808400, AA599331, AI826399, AA767812, AA808767, AW385923, AI016110, AA570116, AA437055, AA471293, AA394009, AA442492, W16809, AA306378, AA287514, AW327292, W20041, T81379, W16892, W16816, W76580, AI086244, AA022944, N39663, N39773, N28024, AA355038, N40080, T24737, AA333960, AA337096, AA336844, AI061614, AA092603, H69650, N95146, W16976, AA431265, and AW298810.
HETLH89	274	786458	1 - 249		15 - 263	AA463820.
HETLM46	275	974361	1 - 429		15 - 443	AC006478.
HJMAE34	276	957079	1 - 292		15 - 306	
HJMAZ84	277	919847	1 - 398		15 - 412	AA002128, D80614, AI936856, AA454962, W45609, W25476, H79084, AA253291, D81240, D81550, AI310465, AA454963, AW187987, H77419, AA443024, D61329, AA878315, H93507, D61227, H77765, AI991959, AI571297, N66618, N93599, AA926681, AA861197, AW341582, AI130710, AI089399, AA565959, AA428582, AA855002, AI052480, AA463465, AA502363, AA926699, H93719, AA226686, H79085, AI167771, AI084567, AA594578, AA548424, AW263196, AI123575, AI806033, AI185582, H26225, AA977298, AA904619, AA913056, AA830635, AA809388, AI418325, AA954613, AA428581, and AF151109.
HJMBT23	278	858254	1 - 657		15 - 671	W68790, AI553754, AA741320, AI791865, H20412, AA865287, AI340302, AI681259, AW450355, AI215794, AI767774, AI991972, AI807751, AA378382, AI369759, R43803, AW451952, AA642194, W68697, and AA243542.
HLMNG77	279	675752	1 - 238		15 - 252	AW170054, AI198826, AW104425, AI269001, AI188129, AI217517, AI695935, AA758120, AI016865, AW104993, AB011129, and AC020663.
HLWAB50	280	856552	1 - 353		15 - 367	
HLWAD08	281	958554	1 - 282		15 - 296	T23963.

HLWAG51	282	964389	1 - 1712	15 - 1726	AI742201, AA702146, N41421, N42024, R53820, AI040758, AI022068, N29636, R74596, AA678080, AI743349, N92675, R56690, AA034028, AI71941, AI241444, AA331067, R81024, H54160, H59318, AI184751, AA779352, N41642, R22378, H66306, H13492, N30300, N26409, R27135, H00724, R74487, T86855, R56846, N73527, AA461540, R32619, R53865, R78495, AA367506, W90130, R27290, R21881, C17564, N63764, W90088, AI220639, H67730, H54003, R25201, C18787, R32507, R23955, H00639, R80819, AI248028, AA367507, H59271, AA368366, R23956, H13441, AA938123, and AW390834.
HLWAH41	283	944774	1 - 946	15 - 960	R98276, T95945, W33061, AW392670, AW384394, AW363220, U46351, AL119457, AL119324, AW372827, Z99396, AL119497, AL119319, AL119341, AL119443, U46341, AL119355, AL119484, AL119363, AL119391, U46350, U46347, U46349, AL119444, AL119483, AL119396, U46346, AL119335, AL119418, AL134902, AL119522, AL119439, AL119401, AL134528, AL042450, AL119399, AL037205, AL119496, AL134533, U46345, AL134536, AL042614, AL134525, AL134538, AL043019, AL042965, AL042975, AL042544, AL042896, AL043033, AL042984, AL042970, AL042542, AL043029, AL042551, AL043003, AL119464, AL119488, AC000047, AB026436, AR054110, A81671, AR066494, AR060234, and AR069079.
HLWAI13	284	920690	1 - 869	15 - 883	AI032745, AA024482, AA922863, AI701944, AI150858, AI270332, AI151319, AA858133, AW135972, AI093066, W38159, AI247539, H04083, AA641624, H02150, H01456, AA382448, H04750, T49622, AI219287, W02674, AA676625, AI961431, H02149, N27194, AA595296, AA004543, H01225, T58656, AA649738, H01013, AA641643, AA897262, H03388, R63061, AW386273, AA909471, AW389613, R71626, R71240, AI634930, R25176, R79411, AW389614, R79410, R76109, AI202312, AI866010, R24676, W57657, W25628, N39940, AA393303, AC004231, and AL117538.
HLWAJ64	285	746460	1 - 367	15 - 381	AA654781, AA526630, AA478355, AL037771, AI630176, AW275498, AI470646, AI124610, AA846952, AW410354, AI042311, AA837087, AI174766, H23653, C18993, AW089101, AL036037, AL119691, AA493695, AW238121, AI049508, H18354, AL135357, AA523841, AI343233, AI560085, AW080811, AA302973, AA292178, AL039145, AA630672, AA063173, AA704393, AW168520, AI933579, AL037383, AI783581, AA809546, F00107, AA468131, AI366993, AW021735, AA507824, AW303008, AA904274, AA679936, AW168420, AA613789, AA279421, AA640410, AA640430, AI345157, AA303007, AI963720, AW150476, N72663, AW166808, AI246796, AW268973, AI612142, N41888, AA483256, AL043719, AI864813, AI732120, AA174016, AW440545, AA174017, AI818737, AI687343, AA548058, AL121871, AF196779, AL034379, AC006552, AF114156, AC004999, AC006241, AC005412, L44140, AC006001, AC004000, AL033392, AL031283, AJ229042, AL022320, AC006316, AC004707, AC003046, J02846, AC004156, M16553, U80017, AP000114, AF130343, AC005877, AP000466, AP000952, AC004887, AL031311, AC002418, AL096702, AC006509,

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HLWAK69	286	694216	1 - 551	15 - 565	H69568, and AL022393.
HLWAK94	287	715727	1 - 394	15 - 408	R80441, R53837, AA367782, AA713884, AA713743, and AB033064.
HLWAR77	288	947484	1 - 1275	15 - 1289	AA449919, AA449920, and AF119815.
HLWAR78	289	723330	1 - 495	15 - 509	AA367499, and AI138461.
HLWAU18	290	666273	1 - 439	15 - 453	H68343, AI915081, H40478, AA586433, AA326452, AA808631, AA650447, AW265688, AA837771, F17700, N89894, AI567391, AA523293, H63660, AW264393, W18189, AA533408, AA715955, AA582746, AA507993, AA339923, AA904211, AA452569, AL134167, AA937809, F31867, F33037, AI791185, AA745524, AA947369, AI243793, AA878407, AA021139, R93854, AI185394, F30310, AI801563, AI565084, AI923052, AI580707, W78056, AA297006, AA228778, AA526424, AA936718, AI198718, AA347927, AW151541, AA297496, AW366361, AI270647, AA668587, AI370475, AW082076, R70883, AI858889, AI821273, F09355, R70884, AA947375, AI697242, AA658934, AA365744, AI521525, AW002831, AA558366, AC003982.

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HLWBA11	291	966796	1 - 338	15 - 352	
HLWBA25	292	677944	1 - 440	15 - 454	N47928, D78769, AA002046, AI655391, and C16888.
HLWBE31	293	934562	1 - 329	15 - 343	
HLWBE92	294	791362	1 - 505	15 - 519	AA368122.
HLWB102	295	919639	1 - 371	15 - 385	AL133404.
HLWBEK40	296	711000	1 - 432	15 - 446	
HLWBN49	297	713600	1 - 1086	15 - 1100	R27276, R83085, N79154, R67710, H67488, R66311, H54211, H80349, R27267, H66895.

HLWBO68	298	529323	1 - 221			H87378, N99360, W03263, N62439, N69438, N71427, and AC005281.
HLWBQ84	299	782938	1 - 251	15 - 235	N52311.	
HLWBQ86	300	703465	1 - 475	15 - 265		
				15 - 489		AA947352, AA493245, AI307563, R00693, AI358505, AA629668, AA772493, AA557945, AA640305, AA152398, T47075, AA633804, AI344906, AI754257, AI523356, AA584360, H81012, AI620666, AI459879, AI318548, AI885896, AI567676, R79396, T52366, AI114755, AA155817, AA156183, AA349923, AA636077, F35374, AI631299, AA643768, AA524604, AI300507, AW157128, AI969090, W03800, AI803824, AW080118, AW407679, AA601290, AA573564, AW277240, AA369465, AI309059, AI251024, AI828721, AA569220, AA995445, R26871, AW021674, AA015948, AI572680, AW149241, R87909, AI147511, R88475, AI925588, M77964, AI860648, AA447247, AI174701, AW273201, AW273146, AA804975, AW192002, AA522864, AA809104, AI821945, F00937, H53109, AA639209, AA486896, AA526542, R91138, T57516, AA021061, AI002950, AA503932, AW008217, AA604601, AA579082, R86876, AW366198, AA669458, AA351868, AA629533, T57562, W69639, AL022097, AL031594, AC006315, AC016027, AP000692, AC005932, AC003102, AC007298, AC016830, Z97630, AC005255, Z69650, AL022323, U80017, AC005844, AF207550, AL031311, AC004447, AC007227, AC007707, AC005031, AL008734, AC004999, AC007690, AL121603, AL132994, AC006120, AC005516, Z97632, AL133355, AC006162, AL035458, AL031427, AC007381, AC000003, AL031229, Z74696, AC005664, AC005206, AP000275, AC005355, AC005251, AC005667, AC002491, AC004913, AP000037, AP000105, AP000469, AL031657, Z98950, AC005993, AC002395, AP000356, AL049759, AC007263, AC006948, AC006538, AC004856, AL121652, AC004477, AC004835, AJ003147, AC002465, AP000694, AC004997, AC005703, AB001523, AC005581, AL121580, AP000509, AC005585, AC000084, AF111169, AC005821, AC005663, AL049562, AL022165, AL096712, AL021877, AC005231, AB023051, AL049761, AC004991, AL034420, AL031177, AC005589, AC004257, AC005180, AC004953, AL031291, AC006512, AL021393, AL080243, AL122020, AC004805, AL022726, AC007022, AB020873, AL139054, U51280, AC007243, AC005331, AC005305, AC006048, AC007283, AC006057, AP000099, AL008716, AC004150, AL031680, AC005913, AC004876, AC001551, AC004806, AC007361, Z83826, AL035079, AC004914, AC007877, AC004458, AC005632, AC006312, AC005914, AL049776, Z84718, AC007637, AC005209, AP000512, AJ251973, AC002369, AC004254, AC005519, AC008115, AP000036, AC000070, AC003999, AC005602, AL035460, AF006501, AL031674, AP000351, AL031186, AC002477, AL096701, AL049709, AL031284, AC006236, AC007390, AL020997, AL110502, AL024498, Z84469, AC004859, AL035455, AC007564, AC006079, AC004832, AC005822, AL121595, AL022067, AC007314, AL096791, AC005746, AC005041, AF107885, AC004801, AL135744, AL049780, AC007055, AC002524, AC005049, AF109907, AL031721, L47334, AC010205, AF015262,

HLWBS14	301	925300	1 - 271	15 - 285	AC004076, AC004560, AL133448, AL022315, AF205588, D34619, AC004921, AJ229043, AL021395, Z98742, AC016025, AL132826, AC003957, AC008171, AL031670, AC002079, U73479, AC000075, AP000260, U95739, AL035209, Z82201, AC006547, Z81450, AC002302, AC004652, AP000503, AC004659, AC006013, AC007050, Z82198, AC005060, AC004500, AC005755, AL096757, AJ133269, AC006511, AC009405, AF111168, AC005318, AC004032, AL021391, AL049777, AC005837, AL031985, AC005759, AC004854, U89337, AP000030, AL021155, AL031587, Z83846, AC006390, AL031058, AC002364, AL031767, AL022326, Z97056, AC006597, AC005856, AL022313, AC004000, AL022302, AL132992, AC004099, AC004796, AL022336, AC004695, and U91326.
HLWBS43	302	774175	1 - 448	15 - 462	
HLWBZ74	303	679215	1 - 532	15 - 546	H12696, AA367915, and AC005281.
HLWCA67	304	577929	1 - 886	15 - 900	W81241, H12868, H60705, AW393433, R73306, R65857, A1091425, A1808222, A1149187, AA994537, AA700322, AC000115, Z97632, and AF137387.
HLWCM44	305	727699	1 - 310	15 - 324	AL121578.
HLWCM70	306	926850	1 - 343	15 - 357	W31589, A1829352, A1982989, R45778, A1346428, AA031570, AA602550, AA455757, A1342486, AA031571, A1394271, A1754665, N51169, A1908523, N50210, and AC005832.
HLWCO66	307	750779	1 - 519	15 - 533	
HLWCQ53	308	869700	1 - 632	15 - 646	R24069, A1148527, AA513449, A1809692, AW452872, AA954445, AA812573, H57889, AW183378, A1619978, AA813225, AW197888, and R26598.
HLWCQ62	309	742778	1 - 824	15 - 838	A1024849, A1024871, N47115, and N50324.
HLWCQ76	310	768018	1 - 261	15 - 275	A1828591, A1954470, A1799304, A1814054, AA455520, T91958, AL135108, and D80002.
HLWDA01	311	913768	1 - 530	15 - 544	AB020629.
HLWDB18	312	790969	1 - 688	15 - 702	Z43873, AA502583, W23097, AL048979, A1797390, A1656908, A1194040, and X99253.
HLWDD02	313	933283	1 - 412	15 - 426	
HLWDE60	314	868276	1 - 439	15 - 453	AC007073, U95626, and AC004065.
HLWDL71	315	759843	1 - 38	15 - 52	
HLWEE76	316	973315	1 - 384	15 - 398	
HLWFG82	317	929647	1 - 545	15 - 559	A1802325, A1161267, A1885931, AA219338, A1660388, AW170791, AW410057, and S56581.
HLWFG04	318	856488	1 - 703	15 - 717	AB023186.
HMVDU41	319	957804	1 - 600	15 - 614	AW195334.
HNBT01	320	914428	1 - 943	15 - 957	A1218626, A1076006, A1922744, A1797880, A1872391, A1559566, AW162613, A1565503, AA449042, A1857802, AW248493, AA074070, AA679085, A1922373, W76538, AA581796, A1929006, AW172513, A1609183, A1682939, AA747871, AA449757, A1885613, AW268637, AA928020, AA568598, A1683858, AW073851, N79729, N62781, A1371131, A1367698,

HNBTT79 HNBTX52	321	965424	1 - 228	15 - 242	<p>AI884907, AW191998, AW016535, N93245, AA379280, AA568887, AA649970, AW264577, H20460, AI221886, AW000860, AI275195, R42681, AW162711, AA460372, AI699657, AW304978, AI081779, AI560482, AI279653, AW243790, AI951374, AW183962, AI696251, AI904299, T78554, R43259, AW079129, AA147203, AI499410, AI475009, AA732831, AA375228, AA379846, AA783050, R51077, N47545, AI474934, Z41466, AA160401, AI678630, Z41592, AW079321, N47546, AI252528, R58857, AA971563, AL022238, and AL137499.</p>
	322	965428	1 - 327	15 - 341	
HNBUM19	323	933672	1 - 469	15 - 483	<p>F35097, F24745, AW071109, AA528500, AA460268, H48768, AA715075, AA593273, AA715173, AI820526, H73306, AA648957, AA836548, AW439703, AA846482, T47889, AA708194, AA772704, AA302690, AA890060, T54173, N36143, AA058312, H58883, AL117352, AC007011, Z97056, AC002425, AC003982, AL022336, AC002492, AC002070, AC004125, AC005753, AC004963, AL035461, AC005520, Z95152, AL031984, Z95115, Z85996, AL035681, AL035455, AL031284, AC005243, AC007707, AC005233, AC002310, AL035088, AF165926, AL117337, AL034549, AL132712, AC005666, AC002563, AL033538, AC002420, AF205588, Z96753, AL135783, AL031657, AL109628, AC002045, AL049576, AC000015, AL031283, AC004962, AC000026, Z93241, AC006449, AC002059, AC005225, AF129756, AC007057, Z82182, AL034429, L78810, U67809, AC004167, AC009044, AC006064, AC005962, AC006360, AL023807, Z86090, AC007201, AC007880, AC003666, AC007283, AC003070, AC002369, AC004851, AC005519, AC004638, AC006262, AC005081, AC007919, M89651, AC005971, AC004601, AC005940, AL021977, AC005730, AC002452, AC004923, AL050318, AC009509, AC005231, AL080243, AC002390, AC009288, AL031643, AC004832, AC004821, AC005722, AC003681, AL049776, AC002429, AP000552, AL031651, AC006958, Z83846, AC005684, AC005335, AC004882, AC005924, AP000135, Z82205, AC004554, AF196969, AC012085, AC004703, AC011718, AC005102, AC005191, AD001527, and AC007052.</p>
	323	933672	1 - 469	15 - 483	
HNBUM19	323	933672	1 - 469	15 - 483	<p>AI460390, AI141130, AA364420, AA557913, AI185394, AI267884, AI251429, AA639114, AA687542, AL042771, AW264901, AA603264, AI821805, AI821056, AI792092, AA278496, AI446205, AW270768, H72278, AW008074, AI291037, AW277174, N27751, AI436378, H63154, AC005180, AC004895, AL049795, AC002091, AC005562, AC009516, AC005015, AC008044, AF030453, AC007565, AC003663, AL096791, AL049780, AC004985, AC005914, AC003101, AL049776, AL080243, AC006312, AC005081, AF053356, AC007676, AC005229, AC005755, AP000558, AC006571, AL022313, AL031427, AC007686, AC005088, AL133163, AC002477, AB023049, AC005003, AP000552, Z83826, AL079304, AC004386, AC006088, AC006530, Z97054, Z93023, AC004890, AC000353, AC007226, AC005971, AP000704, AL049757, AC002301, U91323, AC008372, AC003982, Z83840, AF207550, AL109628,</p>
	323	933672	1 - 469	15 - 483	

					AC005829, AC002350, AL008582, AL135744, AL139054, AC006039, AC004491, AF050154, AC004033, AJ003147, AC005500, AP000557, AL049653, AC002310, AL031680, AC004967, AP000556, AC004019, AC006509, AL049766, AL031311, AC005086, AC006285, AC004662, AC007540, AP000501, AC005037, AC004878, AL024498, AL035079, Z85986, AC005225, AL031587, Z98200, AC004821, Z97056, Y14768, AC006511, AC004841, AF024534, AC008040, AC007283, AC006101, AF047825, AC005921, AL096701, AC007546, Z95331, AC007229, AC004144, AL023553, AC002418, AC005412, AP000505, AC005519, AC007216, AC005071, AC005261, AL034451, AC005332, AC007151, AC002365, AL035072, AL031255, AC005839, AC006468, AP000512, AC006064, AC005484, AL008718, AF111167, AC006111, AC004876, U80017, AL034429, AC005666, AC004526, AF111168, AC006277, AL031659, AP000008, AC002492, AP000692, AC007055, AP000555, AF165926, AC005488, AC006211, AC005746, AL022163, AF196969, AC005295, AF067844, AL022302, AC002115, U79895, AC002996, AF129756, AC005031, AF134726, AP001052, AL023575, AC005940, AL022721, AL022318, AL031005, AC004477, AC005695, AC004854, AC005944, AL049692, AP000553, AC002375, Z82203, Z98742, AC004832, AC005841, AF196779, AL031589, AC007993, AC005300, AC005696, AL078581, AC005049, U82828, Z82976, AC006160, AC005529, AC006251, and AC002126.
HNBUR07	324	951814	1 - 442	15 - 456	AA759267.
HNGAO08	325	958685	1 - 286	15 - 300	AC003101, AC006974, and AC004099.
HNNNA06	326	917723	1 - 1581	15 - 1595	AA779932, AW069784, AW194351, AL020242, AL128373, AL128364, AL143847, AI990994, AL421235, W95217, W78812, AA855140, AA527080, AL151527, W68234, AA441818, AA143612, AI275577, AI278683, AA908252, W68235, AW195552, AA676541, AI219401, - AW291524, AI299109, AI192236, AA862317, H01997, H56734, H83578, AA884790, H82711, AA774498, AA633305, H94868, H79699, H84425, R09902, T90526, AA904994, AA441880, H03628, AI219227, H03629, AI080080, R73007, H56655, AI567570, R81684, W94691, R81474, R81669, T83566, R12503, H52108, T83061, AI444952, AA342086, H02094, H84426, N58039, AI658795, W80711, and H79700.
HNNNA09	327	917724	1 - 548	15 - 562	AW069784, AI128373, AI128364, AL020242, AL143847, AI421235, AA779932, AI990994, AA143612, AI151527, AW194351, AA441818, AI275577, AA527080, AI278683, AA908252, W68235, AA855140, AI219401, AA676541, AW195552, AI299109, AI192236, AA862317, H01997, H56734, H82711, AA884790, H94868, AA774498, AA633305, H03629, T90526, AA904994, AI219227, AI567570, AI080080, R12503, R81669, W94691, AI444952, AA342086, H84426, W78812, N58039, W80711, H84425, R73007, H79700, H03628, and AI658795.
HNNNA77	328	917725	1 - 1103	15 - 1117	AW291524, H83578, AL020242, AA779932, AW069784, AA143612, AI128373, AI128364, AI143847, AA441818, AI219401, AI278683, AA862317, AA884790, AA633305, AA774498,

						AA527080, AI421235, AI275577, W68235, AA908252, AA676541, AI151527, AI299109, AI909094, AW194351, H56734, AI192236, H94868, AW195552, H01997, H82711, AA904994, AA855140, AI219227, H03629, AI080080, R81684, T90526, AI567570, W94691, R81669, W68234, R12503, H52108, T83061, AI44952, AA342086, H56655, W80711, R09902, T83566, H8426, N58039, H79699, W95217, H79700, and W78812.
HNOAS06	329	933730	1 - 738	15 - 752		AW183087, AA437061, AI992344, AI351831, AA423954, AI655434, AA029186, AI421314, AI025154, AA905377, AI189632, AI148753, AI971532, T77225, T77438, T53640, AA889771, AA029185, and N27393.
HNOAX12	330	969363	1 - 777	15 - 791		N59866, N22173, H24646, H27385, AL119324, AL119457, AL042544, AL119399, AL119464, AW392670, AL119443, U46349, AL119418, AL134902, Z99396, AL119444, U46351, AL119391, AL119363, AL042965, AL119319, AL119355, AL119483, AW372827, AW363220, U46350, U46347, AW384394, AL119439, AL119484, AL119497, AL119401, AL134538, AL119341, U46346, AL134536, U46341, AL134525, AL119335, AL037205, U46345, AL043019, AL042450, AL042984, AL042542, AL042614, AL042975, AL043029, AL119304, AL043003, AL042551, AP000473, AR066494, AR060234, AR054110, A81671, and AB026436.
HNOBF57	331	927903	1 - 769	15 - 783		AI672348, AW173697, AL079990, AI565451, AW305215, AI115462, AW081450, AW020072, AA031780, AA115214, AI094153, AI610893, AI088661, AI051834, AA233114, AA115204, AI469307, AI970462, AI620951, AW130820, N69772, AA495921, N34679, AA987696, AA495922, AA115067, AI770044, AI079994, AA150297, AI434100, AW236674, AI039432, AA961227, AI873440, AA938897, AI681115, AA031879, AA603790, AI301357, N44611, AA243692, AA377521, AA910225, AI913596, AI702644, AA961701, AW452143, AI352693, AI381836, AI767254, AI247300, AI050072, AI830541, AI865675, AI493755, AA573940, AA937056, AI266405, AW138034, AA148788, AA653705, R37287, Z41281, AI090946, AI612953, AW103627, AA326653, AI572322, T49708, T49709, N85358, T49717, N84377, D25919, AP000300, AP000113, and AP000045.
HNOCQ04	332	964933	1 - 686	15 - 700		AI717999, AW404782, AI831040, CI5687, AW410719, AI634938, AI479751, AA723194, AA398997, AA455667, AW410718, AI589849, AA584383, AI130687, AI190201, AI525790, AI460181, W69759, AA456685, AA632185, AA456287, AI298115, R53507, AA644652, D45471, AI368832, AW300844, AI762742, AA976082, AA621626, AI912458, AA781178, AA292406, AA643693, AI814720, AA399628, AI351664, AA989507, AW408212, AA132709, F20423, AA292771, AA765663, AA417936, AA026022, AI282190, AA394242, AA586966, AI351631, AA620713, AA582000, AI708099, R55785, AI039470, AI498903, AA132838, AW406442, AA327225, AA777017, AA564894, AA635420, AI832846, AI203528, AI274498, AA774256, N71139, AA328719, AA418114, AA810589, AA303814, AI832934, T54206, AA084447, AA093329, AA720518, AA552845, D81168, AA304523, AA582959, AA298391, AA838663, AA765473, AA411181, AA187606, AW404897, AA411255, AI814800, AA025235,

HNOCT39	333	952611	1 - 101	15 - 115	H80024, AW375226, AA651654, W01588, AW008079, AA405649, AI283769, AA384979, F25444, AI916435, AA776514, AW407879, AA308415, AA318663, AA081629, AW175606, AI569238, AI245051, AA758698, AI268159, AA707891, AI695095, T65944, AA394168, AA405650, R55866, W69865, T48798, D44876, and AF061177.
					AA806386, AI244963, AW069189, AA811454, AW069641, AA228016, AI926450, N20102, AA984503, AI283001, AI335808, AI022959, AI699076, AW008997, AI092767, AI358493, AI289652, AI309309, AA747446, AA521303, AI460092, AI354930, AW105294, AA902193, AI358182, AA975250, AA576719, AI766428, AI335889, AA071293, T10067, R58045, and AI355753.
HNOCU05	334	957833	1 - 733	15 - 747	AW364014, AW364012, AW364015, AW364019, AI760785, AI267509, AI224905, R80458, N76465, AI384093, N59362, AA513728, AA729606, R80659, AI351352, AI499874, D61921, R69849, AA573139, R31977, and AB033047.
HOCMU03	335	922418	1 - 602	15 - 616	AW374051, AW374048, AW374059, AA047322, AA573420, AA873293, H50745, T67156, and AI718619.
HOCPI03	336	917484	1 - 299	15 - 313	AC004889.
					AC004889.
HODAD73	337	973463	1 - 490	15 - 504	Z93783.
HODAD95	338	974043	1 - 577	15 - 591	
HODAG37	339	529410	1 - 224	15 - 238	
HODAH32	340	859509	1 - 305	15 - 319	AA076906, and AC004976.
HODAJ01	341	921666	1 - 570	15 - 584	
HODAJ35	342	529405	1 - 325	15 - 339	AC005618.
HODAK38	343	529404	1 - 310	15 - 324	
HODAK95	344	960179	1 - 690	15 - 704	AI333350, AI522314, N93898, AI539488, AI276544, AW292555, AA194179, AA193323, AA621456, and N64007.
HODAO16	345	529401	1 - 271	15 - 285	
HODAT56	346	529402	1 - 354	15 - 368	
HODAV80	347	859519	1 - 287	15 - 301	
HODAW60	348	692684	1 - 315	15 - 329	
HODAW84	349	775425	1 - 503	15 - 517	AI800919, AI741507, N21056, AA969954, AA669258, AI018174, AI243491, and AI342531.
HODBC01	350	921662	1 - 290	15 - 304	
HODBC07	351	954161	1 - 317	15 - 331	
HODBE01	352	921655	1 - 102	15 - 116	
HODBH16	353	927781	1 - 286	15 - 300	
HODBO85	354	859559	1 - 156	15 - 170	
HODBT58	355	678444	1 - 303	15 - 317	AA224807, AI355986, AI791718, C14330, AA778962, N94325, AA312559, H71678, H19817,

AA483141, N41775, AW440368, W02497, AI824476, AA224917, H12857, AA747609, AI823705, AI925065, AI025930, AW088631, N68449, AW238253, N69399, AA610381, T54144, AI459943, AI282629, H40324, AA326904, W24312, AA088834, AA721545, R69819, AI246061, AA579152, AI434513, C06004, AI693979, AA93636, AI459904, H68343, AW176639, T94140, AI749893, R42902, AA742815, AA278496, AA550850, C14480, AW162227, N88725, H93152, R93919, AI306717, AA679353, C14557, AW023111, AA225627, AA135811, R92421, AI201474, AA614595, AI609972, AI446336, AI002928, AA622910, AI339725, AL042667, AL042670, N67810, AA648957, AW054936, AI054090, N27874, T40629, AA356310, AA857622, AA838091, AI133514, C18253, R89081, H25938, AA836548, AL041375, AW408767, AA135988, AI417586, AA199864, AA311376, AI445373, AI284543, AA804297, AI254770, N54397, AA730359, AI251944, AA558404, AI251034, AI251203, AI251284, AI250552, AW390309, H19851, AI207738, AA312115, AL096763, AC004841, AC003080, AC005399, AC005566, Z84487, AL096816, AC005082, AF045555, AL049776, AC004814, AC002310, AC004531, AC005736, AC004099, AC004448, AC004112, AL121603, AL049713, AC005632, AP000500, AC005520, AL024498, AC007225, AC005229, AC005081, AC004882, AP000311, AL031407, AC006312, AL049709, Z98048, AP000553, AC008040, AC006441, AC002059, AC005562, AC004129, Z93241, AL031665, AC005529, AC004685, AC007298, AC002070, AF030876, AL022326, AF001549, AC004552, AF111168, AC007199, AC006013, AC000120, U52112, AP000143, AP000555, AF165926, AL020997, AL035086, AC005180, AP000953, AL049779, AC005071, AC005015, Z98946, AC005011, AL031589, AC000026, Z97054, AL109627, AC006468, AC002301, AL022316, AC005844, AC003030, AC005482, AL049778, U07563, AF181897, AC003101, AC005189, AL023879, L78833, AF139813, AF002223, AL050307, AC004408, AL121657, U95742, AF053356, AC005839, AL020993, AC003956, AC005598, AC005846, AL049814, AF047825, AC006576, AL031680, AF001550, AL022476, AC006026, AL021917, AC007283, AC005899, AC007216, AL050348, AP000355, AC006976, AR036572, U91328, AC004999, AC005902, AC004638, AC007308, AF003626, AF126403, AC005531, AC002551, AL080243, AC004859, AC002470, AC003962, AC004125, AC005095, AC005207, AL031447, AC002350, AC004458, AC004988, AL049757, AL031666, AC002302, AL021578, AC000134, AC007546, AC005318, AC007707, AL122020, AC002044, AC006014, AC005519, U80017, AL031291, Z95114, AL133243, AC009516, AL031985, AC006536, AC004991, AP000952, AC005940, AC003108, AL034549, AL008582, AP000510, AJ251973, AC006208, AC008072, AC004551, AL031281, AF109907, AC005516, AL022238, AL133246, AC004983, AL121652, AC005722, AC002381, M89651, AC005751, AC002094, AL023803, AL136295, Y10196, AL117355, AC005049, AF111169, AC002531, AC005332, AC005005, AL049692, AC007934, AC004883, AC006960, AC002073, AC006285, AL034548, AL031255, AF205588, AC005911, AC007687, AC007193, Z93020, AF123462,				
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HODBU95	356	529329	1 - 327	15 - 341		
HODBV71	357	761447	1 - 330	15 - 344		AA115711.
HODCA11	358	967732	1 - 201	15 - 215		AC006977.
HODCA68	359	529400	1 - 256	15 - 270		
HODCD05	360	932218	1 - 767	15 - 781		AA393097, H60256, T97474, R08469, N52915, and AC000955.
HODCH64	361	529327	1 - 111	15 - 125		AA480604, and AA420518.
HODCJ11	362	967320	1 - 344	15 - 358		AI378046.
HODCJ42	363	932638	1 - 324	15 - 338		
HODCL88	364	529334	1 - 409	15 - 423		W94969, W93385, and H70278.
HODCM62	365	859556	1 - 298	15 - 312		
HODCO09	366	573202	1 - 343	15 - 357		
HODCO46	367	573200	1 - 312	15 - 326		
HODCO82	368	573195	1 - 321	15 - 335		
HODCP69	369	507249	1 - 332	15 - 346		
HODCR43	370	529332	1 - 422	15 - 436		Z57028, and Z57027.
HODCT07	371	954149	1 - 303	15 - 317		AL035420.
HODCU01	372	917270	1 - 358	15 - 372		
HODCU02	373	920698	1 - 618	15 - 632		AC018633, and AC005271.
HODCU62	374	524314	1 - 347	15 - 361		AI190063, AA661921, AA063173, AA635739, AA984295, AA613591, F34498, AA584739, AW168618, AI918465, AA322792, AA507547, AA559290, N35894, AA483204, T92797, AA630925, AI284640, AA644070, AI250083, AA362349, M86120, AA295742, AI433008, AF039185, W45625, AA769720, AW021735, F25199, H65170, AA661814, AI223604, AI816141, AA664700, D52587, AA484373, AA508359, AI674174, AA683283, M77986, AA747070, AA486131, AW084466, AA316905, AL042853, AA491814, AI002720, AA866015, M77865, AA309533, AA493695, AA099939, H53984, AW149313, AA493954, AA834707, AI494203, AI345157, AI687343, AI209074, AA279421, AA640635, AA515440, AA788990, AL041619, AA577824, AI471887, N71728, AA376120, AA324585, AI311684, AA838190, AI039584, AI700109, AI904219, N49368, T94317, AA502529, AW150635, AA358515, AI034417, Y14782, AC006205, AC002300, X06123, X61109, AC002094, AL132800, AL133500, AL136295, U18181, AC002565, AC004848, AC004882, AC005529, X14448,

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HODCV09	375	973487	1 - 602	15 - 616	H01843, AA988637, AA487321, A1820602, AW068386, A1097301, AL279255, AA247291, AW138282, AA599014, A1862060, AF034209, AC005172, Z98304, AC008134, AL049744, AC005186, AL109622, AC001227, AC002101, AL021397, AC006362, AC008080, AL008730, AC000114, AC005375, AL021408, AC006568, AC007459, AC004552, AC005881, AL135784, AF003529, AL034350, AL049760, AC006963, AC006926, AC004915, AP000459, AC005070, AC006007, AL031121, AC004388, AC010722, AL023283, AL031779, AL121587, AC007688, and AJ011930.
HODCW17	376	960051	1 - 337	15 - 351	

HODCW37	377	575256	1 - 270	15 - 284	AL133353.
HODCZ20	378	859580	1 - 342	15 - 356	AC007938.
HODDD20	379	933726	1 - 219	15 - 233	
HODDD41	380	529390	1 - 323	15 - 337	
HODDE28	381	529169	1 - 355	15 - 369	AC008063.
HODDF51	382	937759	1 - 255	15 - 269	
HODDG57	383	806204	1 - 694	15 - 708	N69445.
HODDH52	384	742217	1 - 487	15 - 501	AL040588.
HODDM21	385	523270	1 - 236	15 - 250	
HODDM25	386	780472	1 - 566	15 - 580	R06499.
HODDM78	387	859516	1 - 357	15 - 371	
HODDN40	388	859518	1 - 727	15 - 741	AA812474, AC012039, and Z98172.
HODDN59	389	975437	1 - 646	15 - 660	
HODDN93	390	891236	1 - 521	15 - 535	R22206, AI635500, AI769453, and AI743579.
HODDQ02	391	920962	1 - 271	15 - 285	
HODDQ21	392	919295	1 - 375	15 - 389	AA148171, AA136605, W86355, AA295674, AA320600, AA303426, AI391670, H79980, AI952411, AW000989, AI885634, AW450872, AW411085, W90311, AB018358, AB020712, AB018359, AF161393, AF161452, and AF034582.
HODDR13	393	529640	1 - 202	15 - 216	U95122, AF073503, AF073502, AF073504, and AF073505.
HODDS67	394	567197	1 - 341	15 - 355	AW238853, T08054, N36319, AA191661, F13217, T57711, T75430, AL039920, H00125, T36199, R15057, AC007225, AF191298, and U47024.
HODDU70	395	529290	1 - 344	15 - 358	AC002075.
HODDX35	396	531209	1 - 312	15 - 326	
HODEA90	397	782242	1 - 675	15 - 689	
HODEB04	398	927022	1 - 356	15 - 370	AF011889.
HODEC76	399	952204	1 - 599	15 - 613	
HODED11	400	966085	1 - 525	15 - 539	
HODED55	401	859368	1 - 595	15 - 609	
HODED87	402	915909	1 - 1433	15 - 1447	AI290807, AA843195, AI924510, AW205119, AI348581, AI337545, H82747, N33608, AI810344, AI970945, H83622, AI873082, AI690115, AI199002, AW296637, AA600866, AA928078, N49452, AI468390, AA371877, AI204414, AI628721, AI092558, AI309751, and AI692784.
HODEF10	403	963494	1 - 595	15 - 609	D80188, D59859, C14389, D59927, D58283, D81030, D51799, D80253, D80166, D80043, D51423, D59619, D80210, D80240, D80212, D80391, D59787, D50979, D80227, D80022, C14331, D80219, D80195, D80196, D59467, D80164, D59275, D80366, D59502, D57483,

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HODEF87	404	974342	1 - 617	15 - 631	C14389, D59839, D80195, D80043, D80188, D80166, D51799, D51423, D59619, D80210, D80240, D80253, D81030, D80164, D58283, D80193, AA305409, D80212, D80022, C14331, D80024, D80219, D59467, D80391, D59275, D59889, D59787, D80227, D59502, D57483, D80366, D80196, C15076, D51060, D59927, D59610, D80269, D80038, D50979, D50995, D80045, D80378, C14014, D80241, C14429, D51022, AA305578, AW177440, D80248, AW179328, T03269, C75259, AW178893, AA514186, D81026, D80251, AW378532,

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HODEG86	405	784833	1 - 634	15 - 648	
HODEH08	406	963895	1 - 129	15 - 143	AA370640, AW248314, AA371439, AA344067, AA370162, D31255, AA340719, AA331358, AW248978, AA488592, AW406647, W44489, AI083656, AA358813, AA360045, T97410, R07253, AI582770, H29999, Z59378, Z64078, Z64079, and Z54696.
HODEH22	407	974329	1 - 411	15 - 425	
HODEI13	408	859318	1 - 599	15 - 613	
HODEI48	409	841906	1 - 660	15 - 674	
HODEK50	410	859307	1 - 728	15 - 742	AC007075, AC007226, AL080243, AC004967, AC002352, U91321, AC006275, AC002551, AC005519, AC004832, AF196779, AD001527, AC002404, AC005089, AC005952, AC005280, AC003684, AL031431, and AC005972.
HODEL92	411	859313	1 - 252	15 - 266	
HODEN75	412	772940	1 - 579	15 - 593	AW339014, and AC005630.
HODEO87	413	930735	1 - 164	15 - 178	
HODEP04	414	926984	1 - 585	15 - 599	AA317093.
HODEP12	415	965534	1 - 427	15 - 441	
HODEP86	416	784846	1 - 404	15 - 418	
HODEQ28	417	972808	1 - 438	15 - 452	
HODEQ79	418	859287	1 - 516	15 - 530	AB033061.
HODER91	419	789661	1 - 338	15 - 352	AA233995, and AB033047.
HODES86	420	784815	1 - 920	15 - 934	AA063018, AA063458, AI444822, AA666066, T94072, C15362, AA890123, AW190277, N54301, AI866580, AA363003, AI277783, AI018726, AA368329, AA366676, AA329535, AA078184, AL119028, AI926296, H60331, AW243945, AW083934, AA304951, AA702637,

AI054414, AW162303, AA584207, AW089016, AW162047, AI818702, AW270429, AA341865, M86102, C15811, AW161786, AA577824, AW270351, AA501781, AL037632, AI904944, AI224619, AL118912, AI369076, AI268019, R56349, AI654520, AI565084, AI246061, AA356376, AI432298, AA552724, R98835, AI130709, AI536858, AI537995, AA508882, AI278847, AA626840, AA773473, AW051819, AA339789, AA302982, AW069227, AW272640, AW148775, AI668566, AI814682, AA326904, AI291439, AI720403, T62078, AI873627, AA504892, AW337526, AA910941, AA365318, R44855, AW381816, AA126271, AI634187, AA904211, AA626595, AA745628, AI354330, AI381490, AI457313, AA827383, AW132065, AA513189, AA827875, AI357109, AA632556, AA604149, AI134418, AA078137, AI247101, H13120, AI125615, AA314338, AA362440, AA236288, AA888638, T02817, AI251968, AI251976, AI308598, H27788, AI254673, AI246059, AI255003, AI241970, AI223508, AI254658, AI252933, AI251598, AI251298, AI251380, AI254937, AA628740, H65697, H65213, AW337483, AI049630, H03243, T06485, AI521042, AA297776, AI679045, AA525517, H73550, AA351893, AA297496, AA721523, AA721530, AA380781, AA101264, AA564714, AA362569, AI254798, AI199816, AA378195, AA937687, AA584525, AA572813, T06876, AI831172, AW103395, AI284684, AI252207, AA862312, AI270149, N54179, U02047, AC004531, AC004382, AP001116, X58139, AC007114, AP000310, AP000547, AC004646, AC005242, Z94161, AC004644, U89336, AL049650, AC006057, AF139813, AC007023, AC005899, U77079, U77081, AC000061, AC003110, AC006450, AF015416, AL133289, AC004552, AC008103, Z98051, AC004834, AL132712, AP000513, Z98745, AC005320, AC006482, AL049591, X96421, AC007325, AC004228, AC005778, Z73963, U77080, U77078, AL049829, AC004494, Z84487, AF196969, L22968, AC005678, AC005544, AC004999, AL022323, AC004585, AC006441, AC005224, AC006277, AL022728, Z68872, AC005399, AC005175, AC004551, AC011422, AF111168, AP000260, AC006084, Z68756, AC005237, AC000003, AC006430, Z84497, AC002375, AC002352, AI133448, AC006049, AC004832, AC005632, U69641, AC003689, AF053356, Z98044, AL035405, AL096767, AL0233513, AC004841, AC002312, AF196779, AP001053, AC004998, AL024507, Z84719, AL034423, AC007204, AC003109, AL023807, Z99291, D89927, AI031984, AL031776, AC008044, AC005232, AC002504, AC002425, AF030453, AF196971, AC004217, AC003682, U85195, AC002325, AL132774, AB023049, AP001056, U73644, AC004263, AC002384, AC005872, AL022313, AC008055, AC004820, AE000658, AC003080, AD001502, AC006312, AC009784, AC004782, AL031667, AC003107, AC000052, AC007015, AC006251, AC005338, AC004988, AC007314, Z82190, AC000379, AC006285, AC005666, AC006947, AL078581, AC004253, U91323, AP001137, AP000099, AC002314, AL008712, AL035703, AC007057, AC000118, AL133396, AC006543, AC005514, AC004876, Z83845, AL037666, AF038458, AC005180, AL135960, AI131016, X82877, AL031736, AC004815, AC004882, AI035450, AI008718				
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HODET03	421	922988	1 - 485		15 - 499	
HODEV13	422	859302	1 - 756		15 - 770	
HODEX10	423	926260	1 - 373		15 - 387	
HODEX31	424	922473	1 - 512		15 - 526	
HODEY08	425	972984	1 - 1100		15 - 1114	AI084273, AA573804, AI131332, AI597908, AW166900, AA335039, AA826556, AA451989, AA286811, AA953404, AW075574, AA605285, AA919038, AA701491, AW086028, AI565546, AA885214, AI248960, AA84815, and AA974731.
HODEY13	426	859323	1 - 686		15 - 700	
HODEY80	427	859296	1 - 873		15 - 887	AL049821.
HODEZ02	428	918672	1 - 208		15 - 222	
HODEZ11	429	952166	1 - 431		15 - 445	AF195658, AL049780, and AC006530.
HODFA38	430	934266	1 - 627		15 - 641	AA570447.
HODFB05	431	929733	1 - 627		15 - 641	
HODFB57	432	972810	1 - 641		15 - 655	
HODFB88	433	792979	1 - 620		15 - 634	AA381448, AA381591, AA307619, and U46407.
HODFD08	434	958371	1 - 383		15 - 397	
HODFD10	435	963516	1 - 560		15 - 574	
HODFD45	436	780531	1 - 387		15 - 401	AC009263.
HODFE69	437	859338	1 - 288		15 - 302	
HODFG37	438	782219	1 - 523		15 - 537	AL009031, and AC002326.
HODFH02	439	915257	1 - 280		15 - 294	
HODFH76	440	783783	1 - 521		15 - 535	
HODFI01	441	859549	1 - 488		15 - 502	
HODFK18	442	974313	1 - 728		15 - 742	AW194418, and AI859957.
HODFK94	443	974318	1 - 635		15 - 649	

HODFL91	444	918456	1 - 517	15 - 531	AL009031, and AC002326.
HODFN19	445	859334	1 - 507	15 - 521	AI498226, AI468496, AI675849, AA411880, U95626, AL022334, AC005234, AC002524, AC006031, L47334, AL049594, and AC005011.
HODFN42	446	921529	1 - 304	15 - 318	AI670069, and AA934600.
HODFO03	447	859329	1 - 297	15 - 311	AC002044.
HODFO37	448	859314	1 - 530	15 - 544	AI669554, AA854975, AI016754, AA024782, and AA009958.
HODFP40	449	921651	1 - 902	15 - 916	AW195474, AI754576, AI301859, AA846702, and AC004889.
HODFQ02	450	918637	1 - 601	15 - 615	
HODFQ06	451	934304	1 - 524	15 - 538	AI523074, AI709307, AI284105, AA904211, AI271762, AI735609, AW270258, AI031759, AW082076, AA515351, AW083934, AA744227, AA713765, AI955029, Z33592, AA478602, AW028376, AA744094, AA548692, AI492579, AI267356, AA297496, AA493628, AA912287, AI431513, AA492524, AI247101, AI061313, AI267450, AI613389, AI311796, AA657374, AI281818, AW274078, AW303196, AW274349, AI348597, AI889579, AW272640, AW089016, AA604831, H52283, AA837642, AA827383, AA744048, T49184, AI253376, AC005815, AC008132, AC007981, AC012330, AP000550, AC008018, AC007324, AC007325, AC009288, AP000552, AC007664, AC007708, AC009399, AC007917, AL034419, AC005209, AP000511, AL050341, AL035681, AL022329, AC004832, AF205588, AC004019, AC005250, I34294, AF030453, Z97054, AC005837, AL139054, AC005529, AC004525, AC005519, AC007450, AL049712, AC007225, AL031594, AC004675, AL121825, AC010205, AL031311, Z81366, AF088219, AL117354, AC005740, AC005102, AC005089, AL133448, AC002312, AC005037, AL049631, AL024498, AC003043, Z85987, AC006443, AC005914, AC005399, AC005081, AC004893, AC006538, AC005800, AL049569, AL117352, AL135744, AC005881, AC006241, AC016027, AC006126, AC004757, AL022313, AP000257, AC006501, AC006014, AC005527, AL049759, AC006430, AC006285, AC004878, AC008101, AP000501, AL121757, AL034417, AL008726, AL035685, M90058, AP000512, AP000704, AC005901, AC004884, AL031670, AC004491, AC006511, U80017, AL034418, Z97630, AL078463, AC005231, AL035462, AF207550, AC005488, Z98051, AL133382, AF053356, AL022316, AF092858, AC005940, AP000355, AC008038, AC005015, AB003151, AC006536, AC005920, AC004167, AC003101, Z97056, AC007057, AC005962, AC002316, M84371, AP000347, AL031681, AL022238, Z94801, AP001054, AC005736, AL031282, AP000098, AL133353, Z75741, AC002128, AL008582, AC005695, AC016830, Z85986, U96629, AC002039, AL132857, AC005220, AP000694, AL121658, AC004752, AF017104, AF045555, AL031602, AC007546, AC005088, AC002301, AP000557, AC004992, AC004659, Z82190, AL031662, AC016025, AC002401, AC004655, AC016831, Z69705, AC007406, AC006121, AC005755, AC002369, AC006211, Z98946, AC005730, AC002352, AC004662, AB023049, Z84466, AD000091, AC005031, AD000092, AC002470, AP000692, AL020995, AC009247, AC004653, AC004754, AC004859,

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HODFT52	452	915232	1 - 789	15 - 803	
HODFU02	453	918536	1 - 386	15 - 400	
HODFU06	454	934229	1 - 625	15 - 639	
HODFU47	455	806232	1 - 641	15 - 655	Z68868.
HODFU54	456	965526	1 - 123	15 - 137	AW265148.
HODFW17	457	859322	1 - 599	15 - 613	
HODFX57	458	975259	1 - 407	15 - 421	AW008635, AC018633, and AC005271.
HODFY16	459	958329	1 - 776	15 - 790	
HODFY79	460	975253	1 - 525	15 - 539	AA262613.
HODFZ11	461	965104	1 - 349	15 - 363	
HODGC04	462	926863	1 - 201	15 - 215	AC019014.
HODGC61	463	973449	1 - 512	15 - 526	
HODGD05	464	931071	1 - 135	15 - 149	
HODGH02	465	917969	1 - 626	15 - 640	
					D80164, C14389, D80227, D59467, C15076, D50979, D80269, D80195, D59275, D59502, D58283, D51799, D59859, D80022, C14331, D80166, D80043, D51423, D59619, D81030, D80210, D80391, D80240, D80253, D59787, D59610, D80188, D80038, D80378, D80212, D80193, D80196, D80219, D59927, D57483, AA305409, D80366, D59889, D50995, D80024, D80241, AW177440, AA305578, D80045, C14429, D51022, D51060, T03269, D81026, AW178893, AW378532, AA514188, C75259, C14014, D80251, D80248, AW179328, D80522, D59695, D80134, D52291, D51250, AW369651, AW178775, D58253, AW177501, AW177511, AW178762, AW176467, F13647, AA514186, D80133, AW360811, AW352117, AW352158, C05695, D80168, AW375405, AW377671, C14298, D80268, AI910186, AW179332, AW378540, D80132, AW366296, AW360844, AW360817, AW375406, AW378534, AW377672, AW179023, AW178905, AI905856, D80302, AW378528, D59373, D51103, AW352171, Z21582, D80439, AW377676, AW178906, AW352170, AW177731, AW178907, AW179019, AW179024, D80247, T11417, AW179329, AW177505, AW179020, AW360841, AW378543, AW178909, AW177456, AW360834, AW178980, AW177733, AW352174,

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HODGH04	466	926255	1 - 617	15 - 631	C14389, D58283, D80043, D80391, D59787, D80253, D80196, D59467, D51022, D80366, D80188, D59859, D80022, C14331, D80166, D80195, D51423, D59619, D80210, D51799, D80164, D59275, D80240, D81030, D80227, D59927, D59502, D50995, D50979, D80212, D57483, D80219, C15076, D80269, D59610, D80038, AW177440, AA305409, D59889, D80193, D80024, AA305578, D80378, D80522, D80241, D81026, D51060, C14429, D80045, AW178893, C75259, D80251, AW179328, T03269, D80248, AA514188, AW378532, C14014, AW177501, AW177511, AA514186, D80133, AW360811, AW178762, D58253, D51250, D80134, AW377671, AW178775, F13647, D80132, C05695, AW176467, AW369651, AW375405, T11417, D80268, AW352117, A1910186, AW179024, AW352158, AW366296, D80168, AW360844, AW360817, AW375406, AW378534, AW179332, AW377672, AW179023, AW178905, D52291, D80247, D80302, AW352171, D80439, AW377676, AW178906, AW352170, AW177731, AW178907, AW179019, AW179018, D59373, A1905856, AW177505, C14407, AW179020, AW360841, AW378528, AW178909, AW177456, AW179329, AW178980, AW177733, AW178908, AW178754, AW352174, AW378540, AW360834, AW378525, AW179004, AW179012, AW178914, D51103, Z21582, AW367967, D80157, AW177722, AW177728, AW378543, AA809122, D51759, AW179009, AW178774,

HODGH07	467	951933	1 - 538	15 - 552	AW178911, AW352163, D59627, D58246, AW352120, AA285331, AW178983, C06015, D51097, AW178781, D59503, T48593, D58101, D80258, AI557751, D80014, AW177723, D59653, H67866, D51213, AW177508, AI535850, D45260, AW378533, C14975, AW367950, H67854, C03092, C14227, AW177497, D60010, AI525923, AW178986, D80064, D59474, C14973, D81111, AI525227, C14957, AW177734, T03116, AI525917, D59317, T02974, D45273, C14344, D51221, D50981, AI525920, AA514184, AI557774, AI535686, AI535961, D59551, C14046, D60214, AI525912, C04682, AI525235, T03048, AW378542, C16955, H67858, AW378539, AI525242, AI525925, Z33452, AI525215, C05763, AI525222, AW360855, AI525237, C14298, AI132110, AR018138, A84916, A62300, A62298, AB028859, AR008278, AF058696, X67155, Y17188, D26022, A25909, A67220, D89785, A78862, D34614, D88547, Y12724, X82626, AR016808, AR025207, A82595, AB002449, A94995, AR060385, AR008443, I50126, I50132, I50128, I50133, AB012117, AR066488, AR016514, AR060138, A45456, A26615, AR052274, X68127, Y09669, A85396, A43192, A43190, AR038669, AR066482, AR066490, A44171, AR066487, A85477, A30438, I19525, A86792, I18367, D88507, I14842, AR054175, X93549, D50010, Y17187, A63261, AR008277, AR008281, X64588, AR008408, AR062872, A70867, AR016691, AR016690, U46128, D13509, A64136, A68321, AR060133, I79511, AF135125, U79457, AF123263, X72378, AR032065, and AR008382.
					AI686005, and AI658703.
HODGH11	468	965105	1 - 631	15 - 645	AL050320.
HODGH91	469	968794	1 - 527	15 - 541	AL033547.
HODGI08	470	958235	1 - 253	15 - 267	
HODGI67	471	974297	1 - 520	15 - 534	
HODGL54	472	859303	1 - 686	15 - 700	AI701008.
HODGM46	473	974051	1 - 1000	15 - 1014	AW407007, AI125143, AA847341, AL044966, AA837771, AA582746, AA557945, AA610255, AA368329, AI732911, F35684, AA579082, AA522864, R67701, AI459879, AA635150, AI633386, F26395, AW021674, AW028376, AI468993, F00937, AA846046, AA640563, AW304580, AI251024, AA354868, AA158549, AI370470, AW275432, AI445699, AI538404, AA507990, AA219166, AI308529, H47461, W69639, AA825954, AI367551, W45215, AA610644, AA015948, AW407679, AA506734, AI636734, AI572680, AA507291, AA351868, AA569206, AI246386, AA368659, R79396, AA935827, AW238016, AA578245, AI135490, AW196288, AI828721, AI520984, AA661590, AW029626, W45416, AA460786, AI355246, H29914, H68343, AI921765, AA155817, AA219349, F16409, AI475611, AI888050, H79277, AI884404, AA706202, AW023975, AI281622, AW162314, AA468458, F34151, AL079894, AA804694, T03928, AA132445, AI567676, AI114494, AI245693, AA664963, AI434103, AA349016, AW162332, AA362440, AA831919, AA557790, AA225630, N66744, AI619727, AA582374, AA828834, AA778580, AA650528, AA719523, AI250552, T40838, AI251034,

AI254770, AI284543, AA664126, AI350189, AI054090, AA715508, AA714011, AA385094, H78984, AW020682, AA176476, AA828840, AW023390, AI925588, AI733717, AI523356, AW151018, Z36862, AI337612, AI564209, F24745, AA364147, T94394, AL134940, T05617, W27084, AI053978, AW407889, AA226532, T15890, T40853, AI251284, AI251203, AI193417, AI223626, AW020150, H81406, AA358531, AA749196, AI537368, AI249853, AI221027, AA599423, AI963816, AI702049, AI339725, AI694154, AI246061, T50676, F34157, AI348780, AC004253, AC005913, U47924, AI109952, AC007201, Z85987, AC004587, AC004973, AL031447, AL022578, AC005067, AC007030, AL049735, AC007204, AC007285, AC003109, AP000692, AC005914, AC002369, AL133163, AC007637, AD000864, AC005971, AC007792, AC007193, AC004079, AC005726, Z82201, AC005021, AC005015, AC008929, AC006539, AC005317, Z84466, AF031078, AC004264, AC002126, AF030876, AC005197, AC004598, AL035450, AL110122, AC006597, AC004796, AC002091, AC007390, AL133245, AB017602, AL022313, AC004491, AL031666, Z81364, Z82248, AC005800, AC002549, AL117354, AL021407, AL034420, AC003041, AC002077, AC006071, AC004106, AC005291, AP000502, AL049761, AP000696, U73634, AL049869, AL049776, AC005214, AL117258, AC005566, AC005765, AL008724, AC003030, AC000159, AL033538, AC004881, AC007395, AC004895, AC004812, AC002107, AL008712, AL035422, AL031848, Z89950, AC005746, AC007371, AC005531, AC005046, AF139813, AC005793, AL031904, AC005900, AL135783, AC007277, AL133353, AC006581, AC005887, AC000004, AL121852, AL034417, AP000511, AC006130, M87912, AC000082, AC004844, AC005601, AC004228, AL031258, AC005696, AP000116, AC005921, AL122020, AC002350, AC003692, AC004762, AF146024, AC006531, Z97630, AL049591, AL049729, AC004042, AC002302, AC006163, AC004859, Z85996, AL049872, AL022336, AC005736, AF064019, AL049610, AC006275, AC006222, AC000353, AF217403, Z68165, AC005763, D87018, AP000268, AP000103, AP000033, Z85999, AC004706, AC002073, AC007993, AL078463, AL022721, U91318, AP000089, AP000142, AL049759, AL121915, Z93020, AC003025, AC006561, AL080245, Z98750, AL118516, AP000503, AL133312, AC005832, AI243213, AP000952, Y18762, AL049839, AC004904, AC005940, AC005081, Z95118, Z93017, AC007225, AC005952, AL022311, AC005962, Z97633, AC004843, AC005859, AP000008, AP000704, AC006287, AL008707, AC006014, AC006077, AC004408, AP000243, AP000203, AF196972, AC006251, AL034548, AC007376, D87675, K00061, AL049611, AC002463, AL050308, Z83848, AL031685, AL050348, AP000030, AC004522, AL110200, AC016025, AC005288, Z95116, AL035587, AC005697, AL031733, AL024498, AC004616, AC006946, AC002418, AL034423, AC003029, AC003098, AL022331, AL023575, AC005532, AL096702, AL035659, AC006057, U02052, AC003969, U52427, AC005828, AL031433, AL096757, AL049838, AL031291, AL035249, AC005072, AL021154, AL035420, L78810, U52117, AI136363, AI031803, AC007388, AI155870, AI131700

HODGO46	474	883087	1-599	15-613	U29953, AL024494, Z78021, AC004156, AP001063, AC005379, AC005775, and AC005074.
HODGP37	475	974293	1-552	15-566	AF152364.
HODGP83	476	889967	1-223	15-237	
HODGP95	477	908650	1-345	15-359	AC005189.
HODGQ08	478	958237	1-390	15-404	
HODGQ22	479	974290	1-527	15-541	
HODGQ32	480	974294	1-658	15-672	
HODGQ92	481	894368	1-392	15-406	AW369682, and AB018255.
HODGT62	482	974052	1-547	15-561	
HODGW08	483	958277	1-553	15-567	
HODGX10	484	963427	1-313	15-327	Z84478.
HODGX29	485	913879	1-256	15-270	AC006017.
HODGZ06	486	933783	1-488	15-502	AC007685, and AC007284.
HODGZ10	487	961977	1-460	15-474	
HODHC03	488	922987	1-597	15-611	AI284176, AI907957, and U73642.
HODHD16	489	974924	1-477	15-491	AI557250.
HODHG71	490	926203	1-533	15-547	
HODHH82	491	964935	1-316	15-330	AA002213.
HODHI07	492	952195	1-629	15-643	
HODHI26	493	973423	1-537	15-551	
HODHK02	494	918613	1-289	15-303	
HODHL19	495	973433	1-588	15-602	AC005083.
HODHL56	496	847724	1-636	15-650	AA398482, and T63250.
HODHO11	497	965529	1-270	15-284	
HODHS34	498	965460	1-497	15-511	
HODHY53	499	914554	1-663	15-677	
HODJR03	500	922484	1-537	15-551	AC004804.
HODJY33	501	951404	1-609	15-623	H04619, AW089973, AW002729, AA584259, AI147246, AA196770, and AC007279.
HODJZ90	502	965049	1-250	15-264	
HODKN07	503	933320	1-620	15-634	I44297.
HOFAB15	504	659522	1-422	15-436	
HOFAB40	505	964113	1-543	15-557	AA825531, AA604776, AI245442, AI188441, AI244061, AI753232, AI571537, AW022503, AI222789, AA679606, R40840, AA528442, AI753812, R44539, AI972757, AI095711, AI818331, AW193103, AI479622, AI984270, AI206770, AW188420, AI568325, AI282612.

HOFAB71	506	573337	1 - 365	15 - 379	AI127300, AI085566, AI457985, AI273179, and AF095728.
HOFAD05	507	932211	1 - 294	15 - 308	
HOFAB71	508	772992	1 - 208	15 - 222	AI1718967, AI066500, AI191408, AA970891, W16766, AI074219, F25014, N45385, AA465517, AA602119, N94010, F32882, F26209, F25830, N98860, AI934901, N77808, AA528414, AI338326, AW088372, AI102799, AA320204, AA768215, AI151192, AW419435, AA788658, AI150785, C03969, AI302844, AA725287, AI038871, AI350125, AI568272, AA983392, AA525200, AA977031, AI093521, AI580262, AI720008, H97078, AI313204, AI626036, AA526171, AA877563, AI144433, AA934574, AI079769, AA573686, AA639915, AA574008, AA976783, T51767, AA492272, AI189510, AI281422, W70094, AI926973, AA845331, N75412, AI279463, AA568387, AI201886, AA526497, AW084218, W05113, AI626023, AA315135, AI417313, AA642788, AW192600, AW102964, AA894481, AA737308, AA872663, H93685, AI440105, AI187012, AA829129, AA609288, AA760958, AI187043, AA448150, AI205981, N94451, R77045, AI187001, AA578537, AA181352, R76883, H20456, AI219168, AA614765, AI185992, AA738347, AA708433, F29053, AI984516, AA492189, AI869280, R83917, W30797, AA503282, AA781308, AI301663, AA782226, AA448007, H94367, AA771978, AA844201, AA134082, AI984517, AA782267, AA843941, AA928994, AI205979, AA732966, AA508863, AA349148, AW161501, AI815573, AI816249, AI027040, AA962040, AA373789, AI336883, AA081960, AW082030, AA132228, AA047332, N88037, AW156995, F20253, AI565512, AI041418, AA662040, AW078808, AI818057, AA484511, AA093070, AI581654, AI582679, AI097353, AI171667, AA315167, AA188617, W39735, AI469808, AI364733, AA602974, AI266413, F37845, AA365505, AA132332, AI720272, AA885755, AW071223, W03821, F27365, AW238838, N85440, AA305795, F26565, AA026450, AA082027, H45296, AA188736, AA573675, H49316, N88105, W24397, N88030, AA090865, M36647, Y00764, and S61826.
HOFAB71	509	707359	1 - 372	15 - 386	AI694793, AW328387, AA287690, AW166132, AI701814, AI393309, AW005351, AI807923, AA304908, AA194090, AI799077, AI916382, AI131240, AI630546, AA308513, AW087574, AI138878, AA855025, AI188081, AW300307, AW340414, and R01958.
HOFAB71	510	868887	1 - 352	15 - 366	
HOFMA24	511	782275	1 - 333	15 - 347	R06046, N24376, AA431932, H96741, AI632470, AW130380, AW197748, AI183539, and AB032969.
HOFMB78	512	572941	1 - 386	15 - 400	AI388527, M21456, and X54067.
HOFMB83	513	572839	1 - 343	15 - 357	
HOFMD13	514	916959	1 - 393	15 - 407	
HOFME41	515	867993	1 - 354	15 - 368	X52381, AF163863, M64428, X56219, AF076492, and X56223.
HOFMF03	516	924679	1 - 434	15 - 448	
HOFMF70	517	734917	1 - 374	15 - 388	AA078777, AW205164, M59936, AF099730, AI004856, and AF052692.

HOFMG21	518	973358	1 - 485	15 - 499	AI870389, AI870412, AA443366, AI766675, AI304388, AA669930, W72592, W76106, N34142, AA446942, AI203601, AI021941, AI304344, W88877, AA703026, N21316, AI144379, AI499002, AA081147, AA906273, AI346611, N42621, AI525737, AA865339, AW005448, N46027, AA733097, W67866, AA894580, N41872, N40396, N31251, H70758, AW172490, W35238, AI311556, H95094, AA907108, AA860195, AA890706, AI688154, AI192484, AA516363, AI288868, W80864, AA774581, AL038165, AI193154, AA908255, W67811, AA676415, N67021, AA393462, N56626, AA075113, W24284, AA075002, AI264657, AI025716, AW408230, AI023409, W81429, AI807013, AA772235, AI860208, AI269880, AA644550, H03534, N44250, AA988507, AI051331, AI201765, N80176, AL043900, AA081004, AA923183, H58732, N76206, W03500, AI193593, AW384875, N66943, AA706242, N26033, N40857, AW236343, AW157602, AW131477, AI906913, AA886238, AW272410, AA808734, AA534807, N30627, AA608755, AA454946, AA831555, AA724567, AI743703, D63411, U21871, D13641, AF098274, AF098275, AC004074, AF098276, AC006001, and AF126961.
HOFMH12	519	964722	1 - 464	15 - 478	X59697.
HOFMH38	520	920365	1 - 401	15 - 415	AA070567, AA171448, AA307051, AA298011, AL120861, AI797040, AA314999, AA297768, AA171428, AA306518, AA297854, AA298067, AA297773, AA297845, AA297622, AA297767, AA174031, AA130315, AA298079, AA297689, AA297215, AA297921, AA297687, AA297842, Z31555, A45919, D43950, and AB022158.
HOFMH95	521	973359	1 - 197	15 - 211	
HOFMI01	522	609722	1 - 108	15 - 122	AW372827, AL134528, AL134518, U46346, AL119444, AL119391, AL042965, AL119363, AL119496, AL119319, U46341, AL119443, AL042970, AL134538, AL134532, AL119439, AL119484, AL042850, AL119418, AL119304, AL119320, and A81671.
HOFMI62	523	796358	1 - 440	15 - 454	AJ388527, M21456, and X54067.
HOFMI63	524	745133	1 - 211	15 - 225	
HOFMI44	525	719663	1 - 385	15 - 399	AA037037, AA046808, AI074059, AI025254, AI038824, AA046825, AI335087, W46671, AI141435, AI141175, W20117, AI081430, AA156232, R78487, F20461, W61182, AI086672, AI308846, AA157472, AA470526, W24222, AA302416, H40198, AA147488, AA804565, AI086624, AI074781, AI147805, AA888822, AI085738, AI088093, AI391491, AI146608, AI095699, AI312528, AI075648, AA927030, AI309731, AA863122, AA844067, AI831194, AI000826, AW263203, AA960909, AI571404, AI073644, AA927505, AA996038, AA888166, AA788786, AI085956, AA366542, AI079406, AA746698, W46844, AA485185, AI041513, AI880811, AA676445, AA974466, N95533, AA156054, AA082321, AI001112, W47172, N23131, AA225981, AA576992, AI741287, AI075640, AA975580, AI028417, AI023076, AI203524, AI079595, AI719742, AA046974, AA862562, AA382891, AI031831, AA082294, AA046881, N29263, AA071499, AA788814, AI137139, H81768, N20551, AA557947,

						AA854218, F29921, N28749, AI192144, AA071339, AA137068, AI085091, N49765, H98947, W61183, and AF070668.
HOFMK22	526	675122	1 - 346	15 - 360		AW247757, AW239330, AA211149, AW249015, AW361739, AI557500, R18319, AF161479, AJ238379, AJ238742, AJ238741, and AJ238743.
HOFMM27	527	973349	1 - 604	15 - 618		R80841.
HOFMM72	528	464015	1 - 405	15 - 419		
HOFMN30	529	514556	1 - 724	15 - 738		W46445, W46513, AA179186, AA128660, AA804464, AW196128, AA583251, AI953806, AI872319, AI284510, AI610404, AI926755, and AL133074.
HOFMP31	530	698097	1 - 292	15 - 306		
HOFMP79	531	775242	1 - 431	15 - 445		AA448573, AA252446, AA082102, W73318, AA339599, N24290, AA887226, R10417, AA037118, and U62940.
HOFMQ04	532	823439	1 - 333	15 - 347		
HOFMQ31	533	906933	1 - 437	15 - 451		
HOFMQ65	534	789347	1 - 390	15 - 404		AW408436, AA403226, AW408309, AA323398, AA101050, and AL050369.
HOFMS68	535	464075	1 - 338	15 - 352		
HOFMS74	536	514568	1 - 580	15 - 594		AI276023, AI627898, AI539262, AI953242, AA947138, AA152216, T08709, H11221, and AC004126.
HOFMS89	537	575820	1 - 502	15 - 516		
HOFMT20	538	669738	1 - 288	15 - 302		
HOFMT43	539	811542	1 - 504	15 - 518		X07382, and Z28396.
HOFMT66	540	754251	1 - 328	15 - 342		AI432644, AI623302, AL134524, AI432654, AI432653, AW081103, AI432650, AI432677, AI431230, AI431307, AI431316, AW128900, AL045327, AI431328, AI431353, AI431312, AI432655, AI431310, AI431354, AI431323, AI431238, AI432666, AI431255, AI431347, W68610, AI432661, AL042898, AI431337, AI492519, AI432675, AI431246, AI431321, AI431315, AI431243, AI431351, AI431235, AI432651, AI432647, U46344, AL042508, AI432674, AI431330, AI791349, AI432649, AI431248, AI431241, AA362690, AI868154, AA362688, AW128884, AL042729, AI432672, AI431357, AI432665, AL042931, AI431254, AA362689, T29199, AI061457, AI432662, AI431345, AL047163, AL042842, AL042655, AI431346, AL042853, AI431231, AI432676, AI432673, AI432658, AL043166, AI431257, AL042533, AL047611, AI682915, AI431340, AL135012, AI872319, AI432657, AL042802, AI431247, AW128846, AI432664, AI432645, AL042787, AL042515, AL042832, AI431751, AL043295, AI927233, AI436446, AI866484, AW337580, AI431350, AI492510, AL043091, AI431318, AI431314, AI268898, AI886152, AI492520, AA130341, AL040207, AW128897, AI924051, AI866786, AW129223, AL042488, R42123, AI432643, AI932620, AI282247, AL042741, R43626, AI440238, AL043089, AI432656, AL046356, AL043321, AW194509, AL045328, R46015, AI431333, AL042420, AL047675, AI492509, AL043278, AA743065,

					AI654286, AL045891, Y17793, AL133074, I66487, I66498, AL133076, AF064854, AF019249, A49045, AR067731, AR067732, AL133053, AL133049, I07209, I09269, I66486, I09270, I09268, I07249, I09252, I09251, AR068508, AR068510, AR067734, AR068509, A63954, I09267, I91969, A49701, A29109, A32111, I66495, AR068550, A23373, AR068551, I66494, AR038307, AR038321, E01324, I08638, A94048, A94061, AR035224, A94046, A94054, I58322, I58323, AL122101, I66497, I66496, A27169, A27170, A39929, A83151, AL133068, AF118094, and AC005144.
HOFMT72	541	563575	1 - 314	15 - 328	
HOFMU33	542	702492	1 - 360	15 - 374	
HOFMU63	543	744325	1 - 231	15 - 245	
HOFMU75	544	713809	1 - 261	15 - 275	
HOFMV84	545	859109	1 - 390	15 - 404	
HOFNA04	546	615287	1 - 361	15 - 375	AJ223493, and U42725.
HOFNA92	547	792734	1 - 329	15 - 343	
HOFNC63	548	973354	1 - 342	15 - 356	
HOFND14	549	658476	1 - 354	15 - 368	
HOFND40	550	867984	1 - 329	15 - 343	
HOFND50	551	727285	1 - 433	15 - 447	AI311825, AI673069, AL039753, AW151107, AW103107, and M85165.
HOFND52	552	727173	1 - 395	15 - 409	AI492509, AI432658, AI431351, AI492520, AI431356, AI431346, AI431357, AI431342, AI432645, AI431236, AI431240, AI432662, AI431751, AI432676, AF064854, and AF048686.
HOFND90	553	716670	1 - 430	15 - 444	
HOFND94	554	717067	1 - 212	15 - 226	
HOFNG01	555	859106	1 - 268	15 - 282	
HOFNG06	556	935569	1 - 261	15 - 275	
HOFNH33	557	715101	1 - 152	15 - 166	AW411124.
HOFNI08	558	974435	1 - 412	15 - 426	W17180.
HOFNI48	559	708727	1 - 364	15 - 378	AW245211.
HOFNI82	560	717355	1 - 349	15 - 363	
HOFNL18	561	666498	1 - 393	15 - 407	AA304945, AA355289, AA312114, AA495817, W72340, AA477457, AI669118, N79824, AI245484, AI372958, AW079905, N21556, AI093765, AW450650, AA099228, R56490, HI5484, AW451773, AW236015, AL080166, and AL031432.
HOFNL25	562	916963	1 - 502	15 - 516	
HOFNL37	563	906250	1 - 382	15 - 396	AA853578, and AA853315.
HOFNL40	564	711205	1 - 212	15 - 226	
HOFNL92	565	770088	1 - 402	15 - 416	

HOFNM85	566	869113	1 - 328	15 - 342	AW245750, AL035943, AW247594, N57316, N57425, T08768, Z43415, AW402184, AA313360, AA670088, W40348, W21269, T72713, AL035940, AW160492, AA313277, AW247213, AA361071, R94160, AL036958, W19964, R18379, T80869, AW405965, AW401713, AA378756, AA325636, N23610, AA340025, W17327, N55688, R19889, AA314671, AA853510, AW403145, AW401537, W22385, W46199, AA773406, W22826, AA345752, AA377322, AA346880, AA367230, A1034239, N87501, R12313, A1033895, AA295206, AW402954, AA204793, W45011, A1191804, AW366672, D31767, and AF085348.
HOFNT59	567	615305	1 - 467	15 - 481	
HOFNU72	568	705435	1 - 324	15 - 338	W20014, AW160778, AA400658, AA340701, AW402919, AW238859, AW161153, AW239281, AW408414, AA355461, A1012504, AF107837, AF083245, AB009398, and AF086708.
HOFNW10	569	916588	1 - 466	15 - 480	
HOFNW79	570	973351	1 - 542	15 - 556	AJ388527, M21456, and X54067.
HOFNY02	571	920218	1 - 569	15 - 583	
HOFNY50	572	715312	1 - 481	15 - 495	AF047704.
HOFNZ15	573	660317	1 - 394	15 - 408	
HOFNZ16	574	859104	1 - 367	15 - 381	
HOFNZ21	575	677372	1 - 444	15 - 458	AA172312, AW245781, AW245685, A1922686, A1752241, AL045207, AW162793, AW239365, AW250530, A1815398, AA306149, AA223817, AA314658, W44751, AW083164, A1123512, AF100752, AC004472, M30143, and U11760.
HOFNZ58	576	683473	1 - 363	15 - 377	
HOFNZ94	577	794308	1 - 334	15 - 348	Z86062.
HOF0A17	578	935553	1 - 357	15 - 371	
HOF0B88	579	751692	1 - 489	15 - 503	A1290790, AW192390, AW291738, AA836267, AA885601, AA911254, AA908258, A1123091, AA262071, A1279611, AA987244, AA335969, AB007946, AB007923, and AF139185.
HOF0B91	580	827631	1 - 220	15 - 234	
HOF0E94	581	924473	1 - 532	15 - 546	
HOF0F57	582	666909	1 - 406	15 - 420	N40054, N27721, A1131355, AA436038, AA292974, A1557218, AW274996, AA631848, A1539429, A1146318, A1804348, AA233902, A1525325, W25483, T47061, AA211343, C17967, AA299376, AW005799, A1090743, T78524, A1363335, A1082444, A1096906, AA327206, A1422717, A1347590, H44711, A1087101, AA743800, AA557194, A1022687, AA234130, AA732876, AW136326, AA339885, AA211344, A1547066, A1333899, AA810604, A1359155, H43647, AA810608, AA771974, A1142815, A1924652, A1219430, W19321, and AD000671.
HOF0F84	583	739399	1 - 627	15 - 641	
HOGAF39	584	947431	1 - 346	15 - 360	A1885126, AW166364, AA490377, AA808700, AA811849, AA524458, AA714038, AA293472, AA890365, A1027804, A1479104, and AF176525.

HOGAU90	585	954011	1 - 388	15 - 402	AI346561, AI380209, and AW135850.
HOGAV36	586	926098	1 - 825	15 - 839	AA080880.
HOGBF78	587	575929	1 - 429	15 - 443	W60879, AI017482, AI928127, AA635802, AI474401, H20562, H18660, AW104847, AA196061, AI337811, R49248, AI479145, R42810, W55877, AA708337, R08049, AA746497, AI039052, AA767341, AA485383, AA446217, AA618521, AA993040, AI097619, AA424341, W93047, AA721661, AA993427, AA810160, AI027510, AW006638, N95297, AI215635, AI004757, AA401727, AI537770, AA435959, AI394624, AI913889, AI559985, AI369769, N90601, AW003287, AI870166, AI570651, AI138811, AI763307, AA290608, AA417963, AW006982, AA281628, AA687619, Z39492, AW241279, AI420717, F02765, AA719464, AA678086, W92459, F03750, AA011105, AI022646, F10173, D51379, AA781896, AI168342, AI081609, AI684382, AA719707, AI202625, H02623, W55878, T33859, N91472, T98912, R83010, AI568204, H46724, H26709, AI383107, AI079597, AA082037, AI368048, AA610613, T16672, AW197260, AA041211, T32957, AI089022, AA678434, AA493501, AI365549, AI912693, AA418140, AI199525, AA446216, AI266356, AW444914, AA055740, AA702510, R59227, AA505711, AW394008, AA251476, AI825733, AW385277, AI690768, AA280842, AW023656, AI608689, D19949, AI907549, AA397950, AC004447, and AB002363.
HOGCR32	589	575931	1 - 195	15 - 209	D86958.
HOGCT45	590	717068	1 - 549	15 - 563	AI929611, and AW161854.
HOGCX95	591	890607	1 - 767	15 - 781	AI073430, AA406136, AW269419, AI004814, AA707533, and AA383178.
HOGEE76	592	968956	1 - 871	15 - 885	AI056641, AW117435, N72573, AA375847, AA375611, AA380835, AA677344, AI271175, AI307084, AI337700, AI305507, AI340671, AI312153, AI224651, AI275349, AI310667, AI349142, AW269088, AI271176, AI224760, AI311163, AI311628, AI345622, AW074879, AI251594, AI792507, AI254775, AI252013, AI306337, AI252014, AI054093, AI224693, AI305393, AI224324, AI271313, AI792707, AI820860, AI251151, AI287949, AI287943, AI249867, AI254561, AI305649, AI252915, AI345009, AW073435, AI349992, AI271146, AI250142, AI252424, AI305931, AI306018, AI305395, AI336707, AI336820, AI337695, AI337711, and AI337773.
HOGEU49	593	961587	1 - 272	15 - 286	
HOOIQ59	594	965013	1 - 699	15 - 713	AA551303, H77748, AI341538, AA281640, AA838724, AA523324, AI0233519, AA887803, AI681516, AI371385, AA962758, AA994841, AI868341, AA670061, AA778604, AA865306, AI360419, AI041265, AI050715, AI193427, AI569655, AA554009, AA315106, AI357495, AA044296, AA535136, AI015647, AA131586, AI735282, AA126719, AA976084, AI523059, AA659914, AA879213, AA748069, F33750, AI002087, H04044, R38305, AW131546, AW391885, AI354856, AA458689, AI479801, F27238, AI311108, AA720819, AA044123, AA334077, and AC006509.

HOVAF17	595	576627	1 - 344	15 - 358	AA143074, AA987383, W60511, AA680304, AA827641, AA308290, AA401334, F25999, AA313726, F22587, AI358423, AA315506, AI141189, W58769, AA575866, AA515848, F19218, F19304, AA156103, F37437, F33656, N98867, F25212, AA740468, AA157759, AA728989, F24956, AA608827, F36060, AA737291, AA194358, AA932208, AI143027, F24362, F31772, F27422, F32057, T57362, AA192185, F24856, AA995725, AA741404, AA314904, F34156, AA889507, AW022412, N55638, F20992, AA526390, W90626, AA007592, F21312, AA954254, AI749361, AA148433, AA579682, F29723, T57445, AI291661, AI282169, F29662, AA491525, AA747585, F22463, F29957, F31884, AI536594, AA664969, F31246, F33617, AA730678, AA385186, F35367, F20491, F29466, F37060, F24202, AA705812, AA492193, AA382505, W88582, AA314719, F34612, W04663, AA157650, F30675, F23580, F27384, F31800, F27612, AI933136, AA974467, F35170, AI826775, AA528421, F29578, F23463, AA767198, F34150, F24124, AA384045, AA492088, F27860, N56464, F31547, F34856, AA594575, AI276978, F33998, AA316521, AI133697, F28088, F29835, F37748, AI384039, AI810403, W81175, AI867973, T74339, AI701341, AA639064, AA976781, AW241684, AA247353, AA007389, F23553, N89217, F27386, T23491, Z40911, T16443, W90249, and AB017710.
HOVAF71	596	757294	1 - 370	15 - 384	
HOVAG49	597	927320	1 - 479	15 - 493	
HOVAI41	598	670963	1 - 93	15 - 107	H13051, R31396, Z36861, AC007057, and AL049872. AW449247, AI089920, AW452240, AI378795, AA431282, AI188684, AI800797, AA236983, AI078809, AI147017, W07506, AI217995, AA976845, AI093869, AA405781, AI150770, AA405716, AI014997, AA235925, AA578443, AA257058, AA773503, and AL078474. AA846482, AA728911, AL043212, AI653783, T47138, AA832016, AA831801, AI185394, F31951, T52772, AW079737, AW271085, AA714073, AA552724, AA810154, AA018923, AA012829, AA633565, AI061619, AI306717, AW419389, H91047, AI800343, AI342786, AI300413, AA356376, AA846923, AA496309, AI915081, AA745628, AA298569, H43183, AI417586, AA640252, AW019964, H62550, AI873627, T40629, AA053463, AI300818, AI310992, AW302670, AI270120, AA230146, AA805848, AI671077, AW084173, AA568856, AL134332, AA626632, AI583291, AA366601, T62078, AI904944, AI133418, AA862029, AA513884, AI889579, AW002330, AI479148, AA568314, AA768179, AI278847, AI627868, AA297789, AI434037, AI251809, R84528, AW272640, AI130709, M78021, AI536858, AI537995, AW073598, AW089016, AI287766, AA434078, AA745543, AL039761, AI281818, F31811, AI445373, AA742775, AI619994, AA811954, N69399, AI302277, AI167179, AA678616, AW341955, AI814682, AW243945, AI291439, AA715605, AI134418, AA728874,
HOVAM50	599	723671	1 - 350	15 - 364	
HOVAO76	600	770066	1 - 860	15 - 874	
HOVBQ10	601	964671	1 - 808	15 - 822	
HOVBY34	602	706816	1 - 404	15 - 418	

<p>H73306, AL037632, AL041375, H84412, H43771, AW078821, AL431513, R70883, AA904211, AA173166, AI678476, AA856866, AA469282, R87912, AW169118, AA633039, AW390284, AW117723, AA569597, AI347665, H67172, AJ865776, AA244181, AA714921, AI955029, AW190277, R87883, AI472736, AI591134, H42893, N91138, AW079667, AW089950, AA59532, R70884, AW272815, AA644223, AW148775, N73060, AA371410, AA420729, AW440568, AI343669, AI064781, AI309121, AI581498, AI538466, AW724191, AI306232, AI251576, AI733856, AI612810, AI817108, AA678932, AI811647, AW002831, AW081610, AA483606, AA019003, AI816058, AA515351, AI628859, AA229988, AA363003, H86221, T74524, AA937809, AA515924, H29914, AL039309, AA630845, AI889995, AI859744, AW117704, AA302661, AI370170, AC006487, AP000555, AC006312, UI8271, AC005231, AC005037, U73330, AC002467, AC004491, AC005288, AC004843, AL008629, AC007686, AC007298, AC004878, AL031120, AC007269, AF027390, AC007055, AF039906, AP000300, AP000113, AP000045, AC005740, AC005529, AC003101, AC004526, AF112482, Z79996, AC003086, AL096761, AC002544, AJ246003, AP000884, AC009247, AC004651, AC004760, AF176815, AC005005, AC006111, AL121658, AC005003, AC008078, AC004991, AL024508, AC005553, AB023050, AP000212, AP000134, AC005089, AC006061, AC004601, AC005684, AC006101, AP000350, AL121754, AC008064, AL096775, AC005532, AC004883, AL096791, AC007514, Z98304, AL031575, U95739, Z83845, AL031005, AL031433, AC002117, U51244, AL031585, AL049575, AL049550, AC008082, AC006449, AC003051, AC004084, AL049610, AC007225, U91319, U91320, AC008545, AC002549, AL031584, AC007344, AL022318, AC008040, AC005940, AF115566, AL109758, U95742, AL117351, AL034423, AF111169, AC006392, AC002543, Z81365, AC005081, AC007277, AC004692, AL049776, AC005015, M87889, AC000090, AP000252, AC005031, AP000030, U80017, AL022396, AC004655, AC006360, AC004025, AC007666, AC004686, U02047, AP000122, AP000054, AL121825, AP000289, AC005480, AP000042, AP000110, AL008730, AL031289, AC005011, AC007182, AL121652, Z98036, AB003151, Z95114, AC004687, AL096818, Z48051, AC002100, AP000067, AC006162, L47234, Z83733, AL035072, AL049749, AC003983, AC000159, AF196970, AL031429, AL031664, AP000355, AL023775, AL031737, AF001552, AC004896, AC005519, U94776, Z75407, AL109627, AL035422, AC007358, AC003108, AC005899, AF196779, AC000134, AL031431, AC006238, AC005602, AL049872, AC005409, Z85986, AL049764, AD000812, AC003072, AL049733, AL023575, AC002126, AL035681, Z93930, AC004540, AC006501, AC000111, AC006013, AL031228, AC004895, AC004776, AC005924, AL080250, AC004000, L78810, AC004231, AL031311, AL117337, AC007736, AC005722, AC005274, AF205588, AP000116, AP000049, AC005247, AL021878, Z99716, AC003690, AL022574, AC004073, AL008635, AC004535, AF196969, AL031295, AF207550, AL078603, AL033381, Z83820, AC007878, AC009509, AC005036, AF130343, AC005207, AP000311,</p>	
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HOVBZ26	603	888442	1 - 203	15 - 217	
HOVCA52	604	727170	1 - 409	15 - 423	
HOVCD39	605	705406	1 - 360	15 - 374	AA535937, AC002314, AC005206, AC005667, AL049832, AC005668, AF111169, AL022316, AC007376, AF001549, AC006160, AC005412, AC007955, U78027, AC007041, AL035422, AC006285, AC005261, AC007227, AF134726, AL031311, X14448, AC005786, AC006257, and AL049830.
HOVCI76	606	858845	1 - 346	15 - 360	AL049694.
HOVICI77	607	713792	1 - 263	15 - 277	
HOVCJ24	608	858844	1 - 305	15 - 319	
HOVCM22	609	674177	1 - 475	15 - 489	AF150146.
HOVCO11	610	970814	1 - 1454	15 - 1468	AI923848, AI680189, AI401617, AI373875, AA455317, AA701656, AI472034, AI573004, AL120931, AA398429, AI051123, AI624093, AI248617, H99041, AI355692, AA687849, AI355703, AI359209, AA757226, AW131426, N33217, N91144, AI342620, N27564, AI298478, AI589126, AW193312, AI923367, AI890992, AI435647, AA788753, AA601557, AI682609, AI583218, AA678000, AW168929, AA614659, AI298694, AA036731, N66889, H97544, AA745905, D62527, H18598, N89744, AI245176, AA403052, AA150090, AI248821, AI287545, N22090, AI263846, AI245198, AA894619, AI185100, AI272966, R69930, AI075972, AI242237, AI435894, AI348194, AA479068, H46858, AI811692, N47754, AI784586, AW058621, AW081918, AW168028, AI346563, AI566456, AI186661, AI433476, AI770052, AI963008, AI187073, R69882, AA812522, AI888697, F36516, AI890986, AA514269, F11075, C02214, AW002830, AA381400, AA381382, AI143203, AI350680, AI375753, AA968981, AI432046, AI080704, AW169284, AI866206, AA150159, AA381630, AI566594, AA381701, AA381636, R76807, R20526, AA844237, AA381643, R27302, AA381945, AA904561, AI280761, R66707, AI382360, H04179, D61736, AI697429, AW378387, R67586, AA805532, AA381644, AI932870, N93493, AA381602, H18624, AA381460, AA381275, AA476343, AA654417, AW104101, N90151, AI805033, AA347509, R32649, R33334, F31071, AW051256, N56395, AA455704, AA744342, AA291227, AA089961, AA761970, N40385, W17019, R07700, N41931, AW021551, R66241, AA284149, AA381605, R52479, T75133, R75976, AW152083, AA167390, W81443, AA804381, AA366783, AW057830, AA482823, AF139791, AA427526, H27061, AA909840, AI802150, AW378359, AA808476, AI679723, AA765452, H39601, AA889282, H18597, AI679152, W04813, AI216644, AW378412, AA036938, T20149, AI915452.

HOVCO58	611	736065	1 - 408			AA130568, R33333, AI570298, N34507, AI280767, AA632567, AA216333, and AC004520.
HOVCQ47	612	496190	1 - 628		15 - 422	AA176289, AI341253, AI476272, AI631533, AA609460, AA503370, AI797388, AA421578, AA421007, and AA310749.
HOVDY04	613	926219	1 - 532		15 - 546	AA725889, AI937507, AI090742, AI190613, AI363396, AA485978, AW137065, AI061260, AA029073, AW449608, AA488604, AA928760, AI560967, AA908207, AI499789, AI499666, AI638627, AI638193, AA670299, AI699081, AI695989, AI538115, AA700477, AA969203, AW207595, AW007189, AA693349, AA029072, AW453024, AL119457, AL119324, AL119418, AW392670, Z99396, AL119443, AL042544, AL119399, AW372827, AW384394, AL119319, AW363220, AL119497, AL134902, U46351, AL119484, AL119391, AL119522, AL119363, AL119355, AL119483, U46350, U46341, AL119341, AL119335, AL119396, U46349, AL119496, U46347, AL042965, AL037205, AL119464, AL119444, AL119401, AL119439, AL134525, AL134536, U46346, AL134538, AL134531, AL042614, AL042984, AL043019, AL042975, U46345, AL043029, AL042542, AL042551, AI142132, AL042450, AL043003, AR060234, AR066494, A81671, AB026436, AR054110, and AR069079.
HOVEE58	614	968699	1 - 251		15 - 265	AA370036.
HOVEK70	615	909138	1 - 804		15 - 818	AI126171, AI807074, AW172978, AI802445, AI811298, AI624106, AI635206, W96514, AI190433, AI810701, AI271523, H43143, AI911113, AI803788, AI566934, AI187824, AA644026, AL043767, AI869010, AI015017, R55050, AA043579, AL045986, W96481, and AA568260.
HOVEV36	616	959234	1 - 531		15 - 545	
HOVJA10	617	961467	1 - 430		15 - 444	
HPCAB21	618	573829	1 - 141		15 - 155	
HPCAB31	619	698320	1 - 456		15 - 470	R73849.
HPCAE18	620	574952	1 - 343		15 - 357	AI910277, AW339592, AI492757, AA767543, AA568133, AB014555, and AB013384.
HPCAH18	621	573395	1 - 337		15 - 351	AL096817.
HPCAH88	622	953808	1 - 624		15 - 638	
HPCAI21	623	655535	1 - 293		15 - 307	R61213, AA021151, AL118746, and AA336609.
HPCAI68	624	655536	1 - 346		15 - 360	
HPCAK16	625	662121	1 - 622		15 - 636	
HPCAK57	626	734931	1 - 407		15 - 421	AL031665.
HPCAL60	627	655723	1 - 317		15 - 331	AI287445.
HPCAL86	628	924709	1 - 308		15 - 322	
HPCAM22	629	655607	1 - 415		15 - 429	AC002381.
HPCAN59	630	655742	1 - 282		15 - 296	

HPCA004 HPCPF05	631	655732	1 - 316	15 - 330	AA622352, and Z18305.
	632	927168	1 - 525	15 - 539	AW294804, AI193110, AI300529, AI336265, AI160012, AA029612, AI832813, AA722195, AA121508, AI860181, AI141465, AI570532, AI857944, R32118, AA099271, AI096365, AI342221, AI808491, AI862033, AI559677, AW023430, AI361255, AI371048, AA865682, AA748042, AI336001, AW022229, AI359397, AA026111, AA115634, AI431331, AI911906, AI680468, W93126, AI954960, AW088396, AI190286, AI346804, AI130942, AI091483, AW189276, AA688307, AI189025, AI767694, AI799469, AW380356, AA807668, AI354954, AW380375, AA043929, AW022523, W02100, H92712, AI301595, AI202850, AW380384, H99705, AI982790, AW237470, R65725, AA098892, AA470877, R24056, AA564293, AI651164, AW271629, AW380377, AA853830, T17200, AA468597, AI651187, R79227, AI686761, AI805208, AA873325, AI077608, R32496, N80064, AI758913, C00620, AI214710, AI783865, AW380370, AA127733, N91757, R65726, AI689514, AI687869, W07026, W00844, AP000315, AP000165, and AP000118.
HPCP007	633	951826	1 - 289	15 - 303	
HPCQY57	634	927135	1 - 357	15 - 371	AW008782, AW050625, AI631996, AI738644, AW050639, AI826984, AI865021, AI823343, AI983601, AI522217, AW195206, AI748866, AI439278, and AF157630.
HPDOT03	635	922481	1 - 370	15 - 384	AI929455, AI816461, AI650907, AW138789, AA577366, AI633916, AA974004, and W57636.
HPDOY06	636	929318	1 - 243	15 - 257	
HPDPJ69	637	966158	1 - 592	15 - 606	AW168960, AA833900, AA384359, AI761053, AW169324, AL080317, AL031073, AF179874, AC007068, Z98750, AC007319, AC006047, D84394, and AP000509.
HPDPK12	638	969340	1 - 304	15 - 318	AA424185, R07403, AI074550, AI074543, AA829693, AA603234, M77858, H56912, AA193445, AA640755, AA296002, N72812, AI803827, N63746, T85040, AA346355, AA865344, W37250, AW245054, AA278641, AI803791, AA669238, AI708384, W42997, AW075979, N71033, T63772, AA189154, R43401, AA837708, C14614, AW073510, R65651, AA504561, AW438765, AI473581, AA740297, AI224583, AA282951, AI049845, AI027056, AI689695, AI192839, AW151713, AI554399, N22797, AA657505, AA129133, AA088727, AA830594, AA569474, AA586661, T92947, AI821239, AW150476, AI350189, AI611331, AI421257, AI362442, H65404, AW342029, AW166879, AI340280, AI433131, AW440315, AI761120, AI342863, AA974503, AI611736, AA748913, AA483211, AW082470, AA299220, C05714, AA526630, H73230, AI702522, AI791336, AA532594, Z83822, AC007676, AL078593, AL117338, AL110161, AC004070, AC002412, AC005911, AL109853, AL049759, AC006115, AC005944, AC004750, AC004647, AL049776, AC005060, AD000833, AL096766, AC004149, AL078644, AC002563, AC005519, AC009247, AC007461, AL133445, Z93242, Z97056, AC005682, AC004771, Z82180, AF003626, AC008044, AL035667, AL009179, U52112, AC006265, AL135744, AP000959, AL022313, AP000011, AL132712, AC009178, AC007790, AC006597, AC007546, U95742, AC007216, AC000088, AC000082, AC003037, AC006511,

HPDPQ40	639	922464	1 - 615	15 - 629	AC006197, AL035400, AL079295, AR060469, AC006140, AB023052, AC005933, Z82976, AC004559, AC005943, Z84721, AL050306, AL023575, AC006974, AP000513, AL050341, AC005004, AC005281, AC004796, AL034408, AC004686, AC006571, AC004126, AC007425, AL031848, AF064862, AC002553, Z83844, AP000555, AC005618, AL110505, AC005037, AC004893, AC005150, AF141309, AC005544, AC004655, AC006001, AC005089, S77127, AB023049, AC004188, AL021807, AC006071, AP000516, AL035659, AC003663, AC007666, AF159056, AC007214, AC006033, AC003080, AF111169, AC000052, AC004019, AJ011930, AC007051, AF001552, AC003982, AC007919, AC003953, AC007685, AC005666, M87896, AL022324, U63630, AP000302, AC000073, AC006162, M89651, AC004073, AC005183, AL023578, Z98752, AP000114, AP000046, AP000141, AC000085, AL031133, AC006539, AC004150, AP001054, AC002477, AC006236, AC004659, AF001548, AC006036, AL133353, AC004832, AP000088, AC006116, AC004386, AL031283, AC006249, AC005291, AC003106, AB003151, AP000688, AC005386, AC005841, AL049576, AP000509, AC006261, AC000075, AC005885, AL034555, AL031670, AC004020, AF165926, AC006199, AL021917, AC007344, AC003101, AC004526, AC002544, AL109963, AF196970, AC005082, AL096791, D86995, AC002316, AC007283, AC007207, AC005664, AC003108, AC005369, AC002454, AC004820, L44140, U78027, Z97206, AL035422, AC003071, AC007556, AC006461, AC007537, AL031255, AL121653, AC004017, and AC002039.
HPDQ005	640	929274	1 - 1104	15 - 1118	AI911379, AI382036, AI523065, AI567528, AA628532, AI359162, AI356788, AA483453, AA483438, AI811858, and T07668.
HPDRB01	641	914437	1 - 540	15 - 554	AI023890, AI744865, AI961389, AA694270, and AA778846.
HPDRD28	642	957791	1 - 498	15 - 512	AA508138, AI950798, AA013140, AA013366, and AL035594.
HPDRG92	643	967704	1 - 347	15 - 361	AI803130.
HPDRO20	644	957678	1 - 208	15 - 222	T96738, R90778, H47758, R94024, AA323896, N51812, and AB033116.
HPDVB07	645	951634	1 - 661	15 - 675	AI925316, C20550, and AW383499.
HPDVE05	646	928647	1 - 828	15 - 842	AL008628.
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HPDVVF03	647	922193	1 - 834	15 - 848	AI183572, W03052, AI656704, AI916980, AA642326, AA337377, AA337144, and AA249832.
HPDVVK12	648	968977	1 - 560	15 - 574	AI148863, AI765291, N70646, AI914033, AI458020, AA551814, AI311395, and AW175659.
HPDVM06	649	933443	1 - 673	15 - 687	AI377852, AI283476, AA954783, AI914476, AI918738, AA371003, AW372827, AL119363, AI142137, AL119444, AL043011, AL119319, AL119304, AL134528, AL134518, AL119483,

						AL119522, AL134538, AL119439, AL119484, AL119391, AL119496, AL042970, AL119396, U46346, AL043033, and AL031777.
HPDVY17	650	955902	1 - 432		15 - 446	
HPEAF19	651	867892	1 - 291		15 - 305	
HPEBA06	652	960802	1 - 242		15 - 256	AA299493, AI580853, AA303099, AI287555, AA299492, AI279700, AA559290, N71724, AF177861, AW338869, AA493503, AA367546, AL031777, AC006130, U73024, AC009509, Y10196, U63721, AC006333, AC004047, AJ012197, AL139054, AL050333, AC006544, AC004527, and D87008.
HPEBA51	653	723298	1 - 423		15 - 437	N69328.
HPEBD31	654	655760	1 - 538		15 - 552	AA196263.
HPEBE44	655	716911	1 - 456		15 - 470	T72867, AA610577, and AC007695.
HPEKG18	656	914115	1 - 84		15 - 98	AF111167.
HPEKJ42	657	922391	1 - 214		15 - 228	
HPEKU27	658	921663	1 - 428		15 - 442	
HPEKX12	659	969251	1 - 355		15 - 369	
HPFAA06	660	960801	1 - 429		15 - 443	AA737020, AW134485, AI874258, AI217712, AA935591, and AW389859.
HPFCA36	661	524720	1 - 275		15 - 289	AC004111.
HPFCA71	662	655596	1 - 351		15 - 365	AI798807, AC007065, AF073930, and AF064804.
HPFCF09	663	536666	1 - 343		15 - 357	AA617957, AI168322, AC005886, AC006071, AC006561, AL096791, AC004223, AC005670, AC002094, AC005156, AC002300, AC004815, AC007308, AP000212, AP000134, AP000030, AC006255, AC004685, AL132987, Z93017, AC002425, AL096701, L77570, AL021453, AC004890, AL049766, AP000555, Z83840, AC005089, AL049650, AC005756, AC008116, Z98941, AL034549, AL109952, Z98036, AL023575, AC002470, AL133445, AC007077, AL121658, AC005187, AC007279, AL080243, AC007546, AC006962, Z95113, AC005332, AC008372, AL031587, and AL035249.
HPFCF24	664	655744	1 - 398		15 - 412	
HPFCF40	665	968600	1 - 339		15 - 353	
HPFCF83	666	781490	1 - 329		15 - 343	AI749823, R99144, AA302658, AW161459, F24175, AI243793, AW161879, AI191343, AA130647, AI679221, AI003797, AA936548, W45457, H24953, AC005057, U62293, U63721, AC005829, AC005102, Z97630, AC005229, AL049830, AF111168, AL035658, AL132712, Z97054, AP000116, AC006241, AC000159, AC002300, AC005747, AB023051, AC009946, AC005323, AC006121, AL049692, AC003030, AC007536, AF047825, AL049757, AC004253, AC004520, AL109952, AC004030, AL023882, AP000512, U91321, AL022313, AF196779, AC0020663, M55987, AC004893, Z75407, AF102137, AC003665, AC004033, AC002477, AF207550, AC012331, AC007666, AF064861, AL049548, Z84480, AC002107, AL030996, AL024507, AC006057, AC004841, AL078644, AC005480, AC002310, Z83838, AL022326,

HPFCH15	667	655768	1 - 344	15 - 358	AC005332, AF165926, AC006061, AC005529, U07561, AC008044, Z95114, X14448, AC004522, AL050307, U63834, AC005846, AL035086, AL022322, AC007226, AP000065, AC005755, AC005914, AC002115, AC005015, AC002073, AC005971, AL031311, AC002350, AC004876, AL022163, Z93930, AC005920, AL031295, AC005527, AC016831, AC005105, AC005081, AC004890, AC002351, AL049780, AC004560, AL020997, AC006449, AC006251, AC008012, AL034379, AC007055, AF001549, AC004475, AL035405, AC003682, AC006512, U80017, AC006480, AL035450, AC006285, AD000092, AL023803, AL080243, AD000671, AC005409, AC005274, AF001550, AC004129, AC002492, Z98950, AC005632, AC007263, U91326, AL034555, AC005839, AL031289, Z82203, AC002365, U91323, AL031659, AF045555, Z84469, AL022336, AF148808, AC005722, AL049869, AC006948, AC003041, AL022316, AC005184, AC007304, AC005874, AF134471, AP000502, AP000010, Z86090, AC005182, AC005479, AL031685, AL031393, U78027, AL021368, AC007207, AC004815, AC005363, AC002470, Z93017, AL021546, AP000553, Z99716, M63543, AC007917, Z95331, AL121754, AC002395, AC004884, AC005625, AC004859, L78810, AC007021, L44140, AC005399, AL021878, AL034553, AP000691, AL031230, AC006453, AC002316, AC004024, AC006211, AP000547, AC006515, AL049569, AC002106, and AL031591.
HPFCH89	668	655538	1 - 226	15 - 240	
HPFCM41	669	655736	1 - 356	15 - 370	
HPFCM87	670	925495	1 - 305	15 - 319	
HPFCN08	671	960365	1 - 363	15 - 377	AA651633.
HPFCO02	672	867871	1 - 263	15 - 277	W85782, AA703530, T99014, and C14044.
HPFCO67	673	867880	1 - 293	15 - 307	
HPFCQ88	674	655749	1 - 387	15 - 401	AI821958, AW150896, and AW205057.
HPFCR21	675	655621	1 - 452	15 - 466	
HPFCR82	676	655533	1 - 389	15 - 403	
HPFCT09	677	655563	1 - 311	15 - 325	
HPFCT53	678	974257	1 - 634	15 - 648	AI525556, AI546855, Z28355, AI526194, AI546999, AI525328, AI556967, AI525316, AI541374, Z30131, AA585356, C16300, AI525306, AI541508, AA585101, AI541523, AA585439, AI546945, AI546899, AI557799, AI541510, AI525431, AI557731, AI557082, AI541013, AI546875, AI557807, AI546828, AI541534, AI540967, AI526180, AI541307, AL134524, D61254, AI547039, AI541535, AI526140, AI541365, AI526184, AI536138, AI557262, T11028, AI540920, AI535660, AI557238, R29445, AI525653, D57491, AI525321, AI557796, AA585453, AI557787, AI547071, AI535813, AI526144, AL041197, AL040155, AL041346, AA585476, AL041096, AL047012, AL041358, AL041277, AL041163, AL041098, AL040621, AL043538, AL041324, AL040464, AL044162, AL041086, AL043496, AL041296,

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HPFCT62	679	655432	1 - 310	15 - 324		AA487150, AA486829, AA347969, AA622801, AI078409, AA602906, AA084609, AL078621, Z96201, AC005484, AF064861, AC004862, AL021393, AP000501, Z97056, AC005244, AL049569, AC005225, AC005318, AC007371, AC002477, AL035443, AF111168, AC004821, AC005104, AL133448, AC006388, AC005839, AL035249, AL022336, AF196969, AC004448, AC009247, AC005562, AC005058, AL079305, Z98051, AL132985, AC005261, AC005089, AC002350, AP000116, AC003102, AC005071, AL050318, AC004525, AC005332, AC006449, AF001550, AC005409, AC004967, AC006312, AC005924, AP001052, AC005519, AC005920, AC010205, Z83838, AC004685, AC005231, AC004814, AC004878, AC005081, AL049776, AC004983, AF130248, AC006946, AL034429, Z86090, AL031984, AC004851, AL109627, AC003663, AL031286, AL049636, AB023049, AL008720, AC004584, AL109798, AC005880, AC002527, AP000553, AL033527, AC004253, AL034420, AC006441, AC000353, AC002303, AC004678, AL008726, AP000692, AL133246, AC004905, AC005015, AC005037, AC002551, AC005088, AL049780, AC002094, AL031587, AL031282, AC004531, AC004655, AL035691, AL024498, AL035458, AC006965, Z95152, AL022238, AP000689, AC004811, AL049539, AC005479, AF001549, and AC002400.
HPFCV19	680	655706	1 - 302	15 - 316		AI279012.
HPFCV71	681	525554	1 - 536	15 - 550		R31337, AW028647, and AF178081.
HPFCX18	682	655588	1 - 325	15 - 339		
HPFDD06	683	960700	1 - 291	15 - 305		AI557495, and AI557116.
HPFDE38	684	655704	1 - 343	15 - 357		AI417952.
HPFDE61	685	974249	1 - 681	15 - 695		
HPFDF79	686	973732	1 - 576	15 - 590		

HPFDG58	687	655610	1 - 310	15 - 324	
HPFDI23	688	655549	1 - 355	15 - 369	
HPFDL90	689	954333	1 - 193	15 - 207	U73330.
HPFDS59	690	655543	1 - 267	15 - 281	AC004111.
HPFDT17	691	581133	1 - 359	15 - 373	
HPFDT54	692	655530	1 - 310	15 - 324	AA593648.
HPFDT61	693	974569	1 - 345	15 - 359	
HPFDU30	694	522113	1 - 357	15 - 371	AL079301, and AC004530.
HPFDU38	695	867879	1 - 365	15 - 379	
HPFDU59	696	739617	1 - 357	15 - 371	AC005225, AL049835, and AL031297.
HPFDV71	697	867870	1 - 680	15 - 694	AW303098, A1061313, A1251203, A1251284, A1250552, AL046519, A1284543, T74524, A1223626, H07953, A1206841, A1234770, A1189682, AW023111, A1826761, A1357823, A1251034, A1249853, AA572813, A1375542, A1755202, A1066646, AW410409, AA129746, A1732430, AA757661, AW276678, A1679759, AW149288, A1635819, A1355007, AW439703, A1491765, A1753113, AW237905, A1149537, AA702637, A1864500, A1334443, AW192179, AL038936, AA904211, A1587583, AA614214, A1247101, AL031730, AC002316, AL031311, AL022328, AC007055, AL022326, AC006965, AL109865, AF109907, AC005081, AL034343, AC005592, AL133485, AL049538, AL022238, AC005355, AC005011, AC007358, AC005291, AL049540, AC008123, AP000688, AC004491, AL080243, AC008372, AL133445, AC003043, AC004685, AC005874, AF134471, AP000501, AF111167, Z83844, AC004675, AL049780, AF088219, AC006552, AJ011930, AC007277, AC005330, AC007243, AC006046, AC004686, AC005363, AC005209, AC005231, AC005746, Z97056, AL135960, AJ131016, AC004883, AC005619, AC005189, AC002430, AP000511, AL032821, AC006213, AF134726, AC007384, AC006130, U91326, AC002544, AC004084, AC004067, AL121603, AC005519, AC005899, AC004821, AF031078, AC008064, AJ010770, AC002369, AF030876, AC009731, AC005844, AC009510, AL031228, AC005406, AL079352, AC005884, AL022721, AL022476, AL049795, AC004879, AC005821, AL049760, AC005234, AC004593, AC007129, AC016830, AP000031, AL023284, X55927, AC006960, AC006203, AC005911, AF001548, AC010202, AC005368, U07563, AC004542, AL096701, AC006241, Z98750, AC005015, AC004656, AF015416, AF001549, Z82171, AC002350, AP000134, AP000212, AP000030, U91325, AC007385, D84401, AC002404, AC007637, AC006511, AC006480, AL031803, AC005606, AC002347, AC000115, AC005829, AF031076, AL031281, AF053356, AC004051, AL096791, AC005072, AL049758, AL133353, AC005565, AC016027, AC003101, AC005531, AC004990, AF001552, AL121652, AC004517, AL117351, AC007011, AC004033, U95742, AC003109, Z70280, Z83845, AC004147, AC007216, AC004805, AC006079, Z84470, AC005747, AC005225, AB023048, AC005099, AC005500, AC004526, AC005701, D87675, AC004841, AC005722,

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HPFDX13	698	655571	1 - 641	15 - 655		W67821, AI934338, AW183528, N55430, AW008575, W67636, AA825800, and N55148.
HPFDZ20	699	655764	1 - 328	15 - 342		
HPFEA08	700	960372	1 - 386	15 - 400		
HPFEA32	701	925499	1 - 295	15 - 309		
HPFMA06	702	953536	1 - 213	15 - 227		AI559365, N40914, AL275689, AI769835, AI935795, AW016872, AA528426, N90231, AI041472, AI074180, AI151237, N40445, AI016719, AI352160, AA828194, H09741, AI982675, AI628382, AI912707, AA918026, N35976, AA460976, AI742265, AI451707, AI191783, AA165615, W74067, AI167928, AA937011, AA724886, R01930, AI863504, AI346991, AI309905, AA992772, AA946858, AI521733, AA055546, AA829079, AI867798, AI636334, AI636278, AA101634, AA992190, AI573041, AA044901, AA128910, N94816, AA708943, AA609789, AA041398, AI056570, AI539174, AI571014, AI318378, AA443890, AI609286, AW235575, AI768743, AA903691, AW028229, AA773169, AI337984, AW273159, AI571376, N33273, AI498347, AW103657, AI824744, H97981, AI433353, AI250273, AI189253, W74059, AI277240, AI200413, AA024491, AW262540, AI767595, AI269009, AI805098, N69196, AI768580, AI689518, AA570675, AA374175, W37740, AA594795, AW088741, AW197140, AA165407, AA165437, AA604629, AI744021, AA780710, AA581888, AA722100, N66617, N30750, N25542, N26634, D61746, AI364247, AI363458, AI719503, Z39345, AA165599, H89567, F04672, AI708771, N91853, AI654339, AI719808, F10645, N71113, AA044690, AI695775, D51138, H89566, AI828511, AI423935, D19831, AI364605, R38667, AA461285, D51197, AI913698, T62947, D62512, AA063398, AI766125, T31394, AL133241, AL009179, and AC008126.
HPFML02	703	917775	1 - 102	15 - 116		AI535639, Z33559, Z32887, T18597, AI541356, C14228, D59751, AI557864, D50992, AI526078, AI557084, AI541205, AI536138, AA492147, AI535660, AI557262, AI540903, AI557082, AI557474, AI525302, AI525500, AI525556, AI557533, AA058620, AI557317, AI525316, AI557809, AI541075, AI557155, H65400, AI541321, AI541365, AI525757, AI557312, AI557602, AI557731, AI525852, AI525661, AI541353, AI541034, R29657, AI525856, AI557258, N71206, AI536150, AI557810, AI541450, AI541346, AI557238,

HPIAE79	704	655748	1 - 382			15 - 396	AI540974, AI546829, D30843, AI535828, AI557543, AI535813, AI536070, AI535994, AI557039, AI541154, AI547177, AI557041, AI557408, AI541027, AI541048, AI557154, U45328, AR050070, A62300, A62298, A82595, A82593, U94592, Z30183, AF006072, and AR025466.
HPIAO83	705	655595	1 - 413			15 - 427	
HPIAQ49	706	919469	1 - 424			15 - 438	
HPIAQ76	707	655573	1 - 47			15 - 61	
HPIAS40	708	928614	1 - 450			15 - 464	AA195825, AA306492, AA418582, C16647, AW160459, AA309024, AA308183, AI571333, AA738174, AA195976, AI570688, AA612815, AA995713, AA418567, AI376546, AA977055, AW162470, AA575997, AA083678, AA100585, R35954, AA643289, AI566298, AI094772, F00910, AI282111, AA492519, AI564065, AA676682, AA622171, AA378734, R35925, AA884373, AI138493, AA156573, AA111863, AI305825, AA553893, AI557187, AA618507, AA469352, AA159175, AI266155, AA469274, N74960, AA412547, W05658, N39508, AA658912, AA083301, AA328913, F26029, AF088991, AF044954, AF067169, AC005363, AC005606, X63224, AF088992, and AF088993.
HPIAV80	709	615007	1 - 211			15 - 225	
HPIAX11	710	923424	1 - 596			15 - 610	AA312500, AA354863, AA319616, T69203, AA491370, H16422, AW403746, and AL031427.
HPIAZ37	711	655753	1 - 300			15 - 314	
HPIBQ37	712	884289	1 - 411			15 - 425	AA101561, W76302, C17760, AA227408, AA215609, AA101519, AA626769, AA359412, T73746, AI927392, AF111713, A91701, A91699, AF207907, AF172398, AF154005, and AB017568.
HPIBR51	713	725539	1 - 454			15 - 468	
HPIBT49	714	655719	1 - 426			15 - 440	
HPIBY65	715	655757	1 - 421			15 - 435	
HPICC89	716	786117	1 - 400			15 - 414	R43644, AA953944, and AL035454.
HPIAB19	717	655540	1 - 191			15 - 205	AA741301, AA331014, AA461592, AI300413, AI342786, H42893, AI302277, AW407007, AI018726, AW157173, AW162314, AW162332, AW168699, R71796, AA657910, AI818313, AA429481, AA633068, AW082076, AL041733, AI471455, AI687343, AI473671, AI963816, H86579, AA225239, H30595, H30568, AA018923, AA012829, AI290145, AI459866, AA643451, AL037006, F35902, AI679759, AW392414, AA084595, AI474085, AI476386, AI925462, AI440243, AA092862, W45457, AI951112, AI620045, AI183426, AA225630, AI167360, H99222, N21300, AA992562, AW190925, AI936229, AW080772, AA829669, AI376239, AI017733, AL039117, AA381880, AW105346, AA112864, C14599, F26285, AA587536, H27788, AA904211, AA827383, AW019964, AW262466, AI799260, AI860535, AA460880, AA643441, AI962050, AI917271, AA604149, AI358557, AI032411, AI131261,

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HPJAB84	718	655531	1 - 314	15 - 328	
HPJAC36	719	655601	1 - 401	15 - 415	AI167181.
HPJAC92	720	867831	1 - 338	15 - 352	

HPJAD09	721	655712	1 - 329	15 - 343	AL080239.
HPJAD66	722	655694	1 - 276	15 - 290	Z83851.
HPJAD82	723	655765	1 - 237	15 - 251	AI979243, and AI967993.
HPJAV07	724	952852	1 - 321	15 - 335	
HPJAW56	725	823393	1 - 757	15 - 771	T93943, T93893, AA399372, and T81024.
HPJB117	726	655761	1 - 417	15 - 431	
HPJB189	727	655708	1 - 69	15 - 83	AC006071.
HPJBK52	728	655751	1 - 249	15 - 263	AW275406, and AC000378.
HPJBU08	729	958979	1 - 351	15 - 365	
HPJBV17	730	655729	1 - 286	15 - 300	
HPJCC04	731	926787	1 - 357	15 - 371	AF108195, AF159714, AF186379, AF106698, AB025784, and AF049330.
HPJCP10	732	964259	1 - 421	15 - 435	
HPJCP11	733	966676	1 - 325	15 - 339	T08031, and AB011095.
HPJCS84	734	590404	1 - 333	15 - 347	AP000494.
HPJCV50	735	968095	1 - 535	15 - 549	AC005923.
HPJCX15	736	655730	1 - 320	15 - 334	
HPJCX26	737	655600	1 - 337	15 - 351	
HPJCY70	738	655569	1 - 218	15 - 232	
HPJCZ03	739	922850	1 - 171	15 - 185	
HPJCZ06	740	934170	1 - 278	15 - 292	AI133297, AW163293, AW303196, AA191659, AW080777, AW084466, AI499588, AA279421, AA548890, AA431949, AA486131, AW301350, AA457070, H71429, AI040342, AW275510, H52274, AL133909, H82316, AI250083, AA661921, AW102846, AL042420, AI953275, AA476397, AI766906, M77893, AA630672, AI205010, AI284640, AL038498, C18550, AA320966, AA579179, AI393931, AA114983, AA774780, AL119713, AI002720, AW274349, AA508359, AI818231, AI271164, AA838190, AI801482, AI298061, T92347, AW103927, AA578327, AI889566, AA832188, AI499301, AI801482, AA504877, AA127426, AA669155, AA984295, AA558884, AA055871, AI733755, AA584876, AA504877, AA168167, AI694130, H09071, AI805363, AI203925, N23504, AA101689, AW104793, AI168167, AI694130, AA572971, AI950983, AI056913, AI345157, AI924872, AW316873, AI046689, AA653857, AA323701, AA772851, AA526787, AA778992, R64559, R95448, AA490183, H49568, AW022897, AA402129, AA493695, AA834707, AA738253, AA719073, T99179, AL035209, AL035450, AC000119, AC002529, AL133371, AC002310, AC007446, AC007845, AC002127, AJ003147, AC007652, AL031053, AC005215, AC003100, AC004638, AC006314, AL033523, AC002416, AC006466, AC006112, AC006312, AC005998, AC004745, U57009, AL049773, AL049733, AC006989, AC012599, AL035608, X53548, AC004161, X54175, D83989,

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HPJDA08	741	958182	1 - 1026	15 - 1040	AJ003623, and AB033053.
HPJDJ58	742	906904	1 - 557	15 - 571	
HPJDP05	743	931027	1 - 607	15 - 621	
HPJDX94	744	838748	1 - 237	15 - 251	
HPJEE38	745	954970	1 - 778	15 - 792	AI371073, AI219866, AA994007, AI624792, AA455079, AA731668, and AI357531.
HPJEI55	746	926815	1 - 218	15 - 232	
HPJEJ39	747	930988	1 - 534	15 - 548	AL121576.
HPJEQ04	748	927618	1 - 353	15 - 367	N31776, D81937, AA308517, W24026, AA188787, T85662, AA486505, AA296183, AA371449, AA480085, H68032, AI905771, N24360, AI557456, AA378402, N44103, AJ230778, N36604,

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HPJEQ22	749	867725	1 - 629	15 - 643		
HPJET90	750	836503	1 - 542	15 - 556		T03269, D58283, D80022, D80195, D80193, D59927, D51423, D59619, D80210, D51799, D80391, D80240, D81030, D80253, D80227, D80196, D80188, D59275, D80219, D80366, D80043, D80038, D59859, D80166, D80212, A1905856, D80269, D50995, D59889, C14429, D50979, D80134, D80378, D80024, D80045, C75259, AW178893, C14014, D59502, D57483, D59787, D59610, D51097, D80164, D80241, F13647, D80268, C14331, D51060, AW177440, D58253, C15076, D59467, D80949, D80168, C14227, AA305409, AW378532, AW178775, AW179328, C14389, AW352117, AW352158, AW177501, AW177511, D51079, AW178762, D51022, AW366296, AW360811, AW176467, AW375405, AA305578, AW377671, D59695, AW179220, AW360844, AW360817, D81026, AW375406, D80248, AW378534, AW179332, AW377672, AW179023, AW178905, AA514188, D52291, D80251, D80132, AW352170, AW352171, D80522, AW377676, AW177731, AW178907, AW179019, AW179024, AA514186, D80133, AW178906, AW177505, AW179020, AW178909, AW177456, AW179329, AW178980, AW177733, AW378528, AW178908, AW178754, AW179018, AW179004, AW178914, AW178911, AW367967, AA033512, AW352174, D80302, AW178774, AW177723, D80439, D80247, T48593, AW178983, D51103, A1535850, AW367950, C14975, AW178986, D45260, A67220, A62300, A62298, D34614, D26022, X67155, A25909, A84916, D89785, A78862, AR025207, D88547, A132110, AB012117, Y17188, A85396, AR066482, X82626, A85477, A86792, X93549, I19525, A44171, AR018138, X68127, AF135125, U87250, AF058696, AR008278, Y12724, AB028859, AR064240, A94995, D88507, AR008443, AB033111, I18367, I50126, I50132, I50128, I50133, AR066488, A82595, AR066490, AR016514, D50010, D13509, AR060138, A45456, A26615, AR052274, Y09669, AR060385, AB002449, AR066487, A43192, Z32749, A43190, AR038669, A30438, AR008408, U87247,

HPJEV06	751	934096	1 - 504	15 - 518	U79457, AB023656, AR060133, X93535, and AR008382.
HPLAN47	752	717680	1 - 488	15 - 502	R77414, R76671, R69252, R76677, R32705, R68709, R62204, H68658, R66563, R69804, H79604, R79061, R28309, H78098, R80677, H13421, H12467, R28193, R26740, R63675, R79115, R28382, R26685, R71045, R80483, A1147439, AA367784, R67876, R75656, R62719, N45236, A1685384, AW074013, A1744897, A1682985, A1830819, A1051767, AW298380, AA429290, A1672705, R79114, H28769, A1961748, A1719461, AA411112, AA292246, AA411111, AA565430, R32518, H03930, AA428704, AA235525, A1244500, AA367885, AW081078, R94826, AW135966, R69938, H13465, H78097, R24254, A1962580, A1656685, R63981, T95910, R76350, R23579, A1765947, R81427, R22392, AA236697, A1096455, T24700, AA430655, R28308, AA564171, R23234, AA811964, A177137, AA483918, H68983, H00975, R32651, H12520, R28594, AA806843, AA292545, R25221, AA744128, AA640543, AA427477, H79603, AA320868, R77413, AA377663, AA525377, H90432, H03929, R69134, H70222, R26973, AA329358, T35477, T31730, T34672, D81451, T19025, AA143133, AA902113, H08404, H08284, R52419, AA902115, R35278, R59021, R36040, Z43118, AF085838, AC005281, AP000884, D28589, AC007114, and AL110197.
HPLAR41	753	557554	1 - 278	15 - 292	AA367867, AA367898, D58066, AA385928, AA610791, A1803229, A1004961, AA298314, AW157413, A1291353, F35348, AL041411, AA663300, AA132536, A1990650, AW139132, N94967, A1290861, A1961193, AA584498, AA657353, AA081993, H96719, A1025602, AA501873, C17730, AA911409, H04879, AA055654, A1250812, A1921101, A1925647, A1559442, A1955464, AA508451, AA946637, A1632138, AW102963, A1568919, AA659014, A1872191, AA862481, A1869945, A1871616, A1538654, A1902795, W45291, W58428, AA166854, AA629837, AA460715, AA092309, AA287329, A1952804, AA176355, AA130476, A1817158, AA767353, A1285660, F16040, AA932087, A1246569, AW262471, N77920, A1862212, AA811111, A1819528, AA864823, A1601265, A1858607, R33901, A1524900, AA771730, AA771711, A1336355, F33397, AA347740, A1421777, N79992, A1499286, A1440018, AW272376, A1453790, N31608, N33132, N20064, A1375417, A1540098, N30146, A1310239, AA364962, A1591332, AA132716, A1628308, N90055, W19865, AA830701, AA129986, AL044349, A1271865, A1457328, A1027421, AA807609, AW085676, A1376984, AL038713, AL119517, AA136576, A1095849, A1082077, N24958, AA961590, H06476, AA779937, A1028382, AA309496, AA091111, A1827493, H01157, AW419031, AA492106, A1088245, AW272291, T48029, AW072619, AA136630, AA099788, A1733728, AL034400, AF030186, AC005350, AL031294, AB020871, AC005852, AC005688, AC006363, Z95328, AC004910, AC002448, AL022151, AF064862, AC004081, AL137191, AC007262, AC004384, AL133233, AL049871, AC006559, AL136504, AP000079, AC006989, AC002524, AC007444, AF002997, AC001604, AC001157, AC005579, AL023582, AC008165, AC006525, AL021307,

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HPLBB50	754	503751	1 - 292	15 - 306	AA368037, and AA368044.
HPLBL31	755	503732	1 - 349	15 - 363	AA368423, and AA368422.
HPLBL57	756	503730	1 - 261	15 - 275	AA303008, AA303009, and AC002427.
HPLBO61	757	558187	1 - 229	15 - 243	AA368593, AA758725, and D86985.
HPMAG19	758	705471	1 - 290	15 - 304	AA369206, AA369215, AW276918, AJ498304, AI859717, AI635381, AI873828, AI806367, AA992384, AI651551, AI073771, N26890, AI479551, AA287708, AI628336, N21211, AI942382, AA553615, AA479887, AW085308, AW137286, AA873472, AA679635, AA586824, AA708432, and AB023229.
HPMAH75	759	766443	1 - 301	15 - 315	AA303039, AA369332, AA335519, AA553332, AA745302, N63749, Z95331, AC003682,

HPMBK34	760	954057	1 - 374	15 - 388	<p>AL022327, AC005488, AL035685, AL031587, AC004856, AC005015, AC005899, AL109628, Z98884, AL035684, AL031589, AC003030, AL133245, AC007842, AC007685, AC005231, AL133163, AL049759, AC005788, AL109801, AL031283, AC005412, AL049874, and AC002349.</p> <p>AA662989, AA668148, AA513884, AI912401, AA303131, AA077247, AA654482, AA493618, AL038527, AI872000, AW105463, AA515351, AA744423, AI590404, F26713, R48980, AW273146, AW273201, AA309232, AI439393, AI926656, H43771, AA631515, AA569715, AI929796, AI798407, AW194077, AA758131, AW157731, AA488903, AW162750, AW003612, AC005940, AC007240, AC005519, Z83840, AC006455, AC005899, AC005482, AL022322, AP000555, Z83822, Z83844, AC007358, AL031255, AC005280, AP000347, AL022313, AC005722, Z98051, AL035415, AL121653, AC005300, AC004084, AC007193, U95742, AL049709, U95739, AL049835, AC007216, AL022329, AL034419, AC002301, AF111169, AC005412, AC004878, Z83843, AC004253, AC000353, AC002477, AC003026, AC005207, AC007435, AF027390, AL008725, AC010205, AC004991, AC008116, AC005829, AP000694, AC005409, AC002425, AP000512, AC006011, AL135744, AL031588, AC005971, AC005529, AC007227, AL031651, AE000658, AC004887, AC002544, AC007308, AF001548, AP000553, AC004019, AP000008, AP000501, AC002300, Z83820, AC004386, AC005015, AB023049, AC004491, AP000704, AC005086, AC004702, AC006372, AC002351, AC002059, AL050318, AC006126, AL132777, Z95114, AF109907, AC005332, AC009247, U95740, AC005102, AC008115, AC004805, AC006285, AC007731, AC006039, AC005839, AC016830, AC006459, AF196970, AC006509, AB023048, AL022238, AP001063, AC006468, AC002470, Z98036, AL008718, AC005088, AC005527, AC006449, AD000092, AC007421, AC007649, AC005484, U47924, AL109758, AL035249, AL139054, Z95113, AF196779, AC006057, AC004517, AC005072, AC005859, AC008012, AL022237, AC007073, AL049552, AC005696, AP000503, AC005089, AF107885, AC005500, AP000692, AC004876, AC005411, AL035587, AC005803, AC005520, AL023575, AC004263, AL022323, AP000504, AC006992, AF029308, AC000052, AC007880, AL133163, AJ003147, AC005746, AC006111, AC007387, AC007276, AC005695, AC008125, AF129756, AC007226, AC004938, Z83838, Z93017, AL035419, AC007011, AC004169, AC005355, AC004382, AL035659, AC005377, AF196972, AL031282, AC008015, AL049697, AP000689, AL031577, AL031291, AC005914, AP000123, AP000055, AP000170, AC005049, AC006120, AF134726, AC003101, AC005005, U52112, AL022316, AC005225, AC007934, Z97054, Z82189, AP000510, AC002094, AC005261, AC007546, AL031123, AC004686, AC007685, AL034548, AC004801, AC003043, AL023513, AC005895, AL117258, AL035684, AL031295, U73024, AC005516, AC004583, Z97055, AC002418, AL031311, AP000346, AC003663, AC004813, AC002400, AC006515, AC007450, AC005383, AC002992, AL121655, AD000864, U91321, AB003151, AC006441, AC006241, AL024509, AC005486,</p>
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HPMBK49	761	577661	1-416	15-430	AL035405, AL035691, Z85996, and AL031650.
HPMBM48	762	575626	1-489	15-503	AA253119, and AA256187.
HPMBN02	763	920865	1-106	15-120	AL031848.
HPMBO10	764	968365	1-349	15-363	
HPMBO61	765	867677	1-431	15-445	AL133650.
HPMBR17	766	785732	1-415	15-429	
HPMBU81	767	557870	1-470	15-484	
HPMBX35	768	531058	1-195	15-209	
HPMBX79	769	577637	1-372	15-386	
HPMBY76	770	531338	1-332	15-346	
HPMBY83	771	527006	1-428	15-442	AI590323, AW379794, and AW379800.
HPMBZ05	772	932527	1-211	15-225	
HPMCB65	773	531289	1-403	15-417	T47761.
HPMCC73	774	531066	1-301	15-315	
HPMCD77	775	529960	1-266	15-280	AI141166, AL040565, and AP000495.
HPMCI02	776	381961	1-416	15-430	R53558, AW183662, AI936591, AI554166, Z39384, and AI658791.
HPMCI65	777	577598	1-275	15-289	
HPMCJ14	778	524768	1-393	15-407	AC000105, AL031591, and AC004032.
HPMCJ19	779	531279	1-241	15-255	
HPMCJ48	780	577601	1-291	15-305	
HPMCK65	781	742095	1-319	15-333	H64820, AA092052, and AL023807.
HPMCS19	782	954056	1-195	15-209	AW136091, and AL031710.
HPMCS65	783	961250	1-120	15-134	AC005923.
HPMCV93	784	657532	1-429	15-443	AA128929, R11967, T78064, AA449505, T74763, and AB018281.
HPMCW25	785	867673	1-630	15-644	AA429660, AI375673, AI656667, AA320869, and AI222277.
HPMCW53	786	727392	1-190	15-204	
HPMCX11	787	967655	1-300	15-314	AW029019.
HPMCY30	788	867687	1-344	15-358	
HPMCY31	789	725180	1-325	15-339	AA113940.
HPMCY35	790	571411	1-637	15-651	T95994, and AW440904.
HPMDJ09	791	582594	1-290	15-304	
HPMDL78	792	577590	1-340	15-354	AF111168.
HPMDO39	793	531275	1-192	15-206	
HPMDR07	794	867682	1-285	15-299	

HPMDT91	795	745346	1 - 334	15 - 348	
HPMDU19	796	577626	1 - 313	15 - 327	N69438, N71427, N62439, H80350, R83031, H66851, H67489, R62741, AA918030, H54212, and AC005281.
HPMDY82	797	531274	1 - 39	15 - 53	
HPMDZ62	798	531276	1 - 360	15 - 374	
HPMEB66	799	531349	1 - 397	15 - 411	
HPMEC16	800	867658	1 - 299	15 - 313	AC006500.
HPMEC36	801	668897	1 - 333	15 - 347	
HPMEC69	802	702501	1 - 270	15 - 284	N20192, and AC008123.
HPMED52	803	531347	1 - 438	15 - 452	AI906494, and AC005004.
HPMEE48	804	531321	1 - 428	15 - 442	AC007966.
HPMEE66	805	577619	1 - 323	15 - 337	
HPMEG50	806	925080	1 - 140	15 - 154	
HPMEI39	807	784781	1 - 704	15 - 718	
HPMFB02	808	920308	1 - 391	15 - 405	AA029876, AA029112, AI089387, W80831, H23039, AA314213, AA209372, AA209368, H55702, AA304885, AI218927, AI021707, AL050345, AI236698, AL080313, and AC006441.
HPMFB28	809	575934	1 - 327	15 - 341	AW197446, AI972578, AI657152, AW204366, AA436769, AA42937, AI261197, AA421160, AA034360, and AI675734.
HPMFB37	810	575620	1 - 648	15 - 662	
HPMFB75	811	526594	1 - 220	15 - 234	T58945, T58884, and AI352293.
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HPMFB84	812	577593	1 - 347	15 - 361	AA917042, AA476820, AA861762, AW197737, AA883969, AI222281, AI394043, AI476496, AI420953, AI816942, AW418714, AI337319, AI312584, AI268413, W60319, H72483, AI125256, AI198189, AI739036, Z57770, Z59847, and Z57771.
HPMFE35	813	577633	1 - 415	15 - 429	AC005909.
HPMFE60	814	577636	1 - 309	15 - 323	
HPMFE73	815	575941	1 - 416	15 - 430	AI009031, and AC002326.
HPMFH21	816	575943	1 - 447	15 - 461	
HPMFJ50	817	575932	1 - 475	15 - 489	R20682, T65200, Z44442, and F11983.
HPMFJ55	818	577588	1 - 369	15 - 383	
HPMFL08	819	959569	1 - 452	15 - 466	AA555286, AA640814, AI281916, AW073979, AI378363, R70468, AW242350, AW013856, AA644290, AW449140, Z93016, AC012384, AI035541, AC005228, AC003662, and AC009300.
HPMFL80	820	874359	1 - 440	15 - 454	AA313895, AA834888, AA362291, AW366931, AA436945, AA496034, AI834310, AA402490, AI039687, and AC004841.

HPMF29	821	582595	1 - 860	15 - 874	AA255639, R53909, A1492887, H09275, AW192355, N48929, and AL117598.
HPMFN12	822	968821	1 - 499	15 - 513	
HPMFP05	823	867662	1 - 413	15 - 427	
HPMFP30	824	577629	1 - 335	15 - 349	AC008072.
HPMFP38	825	575914	1 - 342	15 - 356	AC006121.
HPMFQ84	826	867651	1 - 678	15 - 692	R31294, A1823535, A1823533, AL038977, AW271095, A1252141, AL135383, A1792856, AA594742, AW302832, AA828911, A1284536, A1251563, A1733946, AA578905, A1383596, A1733930, AL047645, A1792695, A1792746, A1792842, A1252190, A1281401, A1689198, T56025, AA553900, AA557493, AA809125, AA484022, AA219181, A1859906, A1089178, AA551067, A1884861, AA169245, AA494047, H81918, A1798313, A1298660, A1038324, A1798569, A1869786, AW269071, A1347649, A1347478, A1761677, AA599080, AC006060, AL022318, AF111168, AL049779, AL034420, X14448, AL021978, AC007731, AC005500, AJ010598, AC000071, U78027, AC015853, AC005932, AC004033, AF001549, AL035422, AC006312, AC004263, AC004000, AC005037, AC005412, AL008715, AC005006, AC006057, AC002544, AC006088, AL133243, AL009051, AL031255, AC005828, Z85996, AC004771, AC006946, AC004527, AL031577, AC005071, AC004675, AC002470, AC002045, AC002390, AC009263, AL135744, AC004821, AC002300, AC005295, AC005952, AL022316, M26434, AF088219, AL035634, Z98941, Z97053, AC005527, AC005048, AC002106, AC007050, AC008124, AC004262, AC005363, AF015416, AC005730, AC007686, AJ006216, AB017602, AJ246003, AL031133, AF172277, AP000248, AP000704, AL096702, Z81364, AC004912, AL020997, Z83844, AB020868, AL110121, AC006023, AL035681, AL080243, AL008721, AL132987, AL121658, AL049745, AC005368, Z98742, Z85987, AL021391, AC007227, AF196972, AC000025, AL031428, AL132642, AC005520, AC005041, AL049692, AL031673, U95742, AL049776, AP000555, AL031846, AL049694, AC004143, AC002115, AC004531, AC006480, AL033517, AL132777, AC004491, AC002350, AL049872, AC007216, AC004129, L78810, AC004797, AL035398, AP000692, AC004941, AC005829, AC005529, L44140, AL022719, AL008718, AL020993, U52112, AC007676, AC006064, AC006356, AC002509, AP000047, AP000226, AF134726, AC004223, AC002477, AC004805, AP000326, Z84466, AC003689, AF030453, AC007151, AC002394, AC009464, AP000501, Y07950, AC008372, AC007566, AC004887, AL031602, AC004841, AC004150, AP000054, AP000169, AP000122, AC004812, AL049569, AC005326, AL109984, AC005323, AL031228, AC004983, AL035416, AF109907, AP000049, AC005800, AP000115, AL031311, AP000311, AC006241, AC004383, U85195, AL023876, AP000131, AP000209, AC007435, AP000087, AC005229, AL031433, Z98304, AC005088, and Z85986.
HPMF541	827	711640	1 - 422	15 - 436	Z95331.
HPMFT04	828	916662	1 - 316	15 - 330	

HPMFU89	829	575894	1 - 326	15 - 340	
HPMFV28	830	652097	1 - 330	15 - 344	AA434145, AI422195, and AC007239.
HPMFV82	831	575911	1 - 363	15 - 377	AL120663.
HPMFV88	832	956263	1 - 353	15 - 367	R56205, N31111, AW403866, and AA338327.
HPMFV25	833	960065	1 - 266	15 - 280	
HPMFV78	834	932529	1 - 466	15 - 480	C18404.
HPMFV13	835	575908	1 - 436	15 - 450	AI245605, AI733381, AW195539, AA994974, and AL050350.
HPMFV65	836	867657	1 - 341	15 - 355	AL031282.
HPMFV70	837	577642	1 - 346	15 - 360	AC005383.
HPMFV92	838	577603	1 - 348	15 - 362	AL008730.
HPMGA83	839	968359	1 - 512	15 - 526	
HPMGB22	840	506379	1 - 308	15 - 322	Z85999.
HPMGC07	841	920313	1 - 367	15 - 381	AI214759.
HPMGC23	842	703835	1 - 421	15 - 435	AA309957.
HPMGE31	843	867648	1 - 422	15 - 436	
HPMGE95	844	873392	1 - 796	15 - 810	
HPMGF06	845	954823	1 - 551	15 - 565	AA034305, AI752781, W38450, AA295920, W69345, AW368627, W01351, AW167099, AA491113, AI093592, AI628843, AA470016, AA459627, R70436, W16698, H30472, R72510, R27103, AI986035, AI926603, H25748, AA432254, W67475, R53035, AA617710, AA865403, AA412294, AA431234, AA514353, AI002434, W69267, R37917, R24912, AA443912, H24995, R72497, and X52574.
HPMGF32	846	577615	1 - 355	15 - 369	AC006960.
HPMGH16	847	577641	1 - 402	15 - 416	
HPMG103	848	924521	1 - 387	15 - 401	AA308643.
HPMG184	849	920326	1 - 269	15 - 283	
HPMGJ93	850	864040	1 - 347	15 - 361	AA361434.
HPMGK37	851	575924	1 - 414	15 - 428	
HPMGK59	852	671936	1 - 492	15 - 506	W51873, AA215789, AA215316, AI654057, AI809466, AI761758, AA292627, N24002, AI860134, AA279010, AA215628, AC003032, and Z56178.
HPMGK62	853	730751	1 - 517	15 - 531	R82057, and AI828591.
HPMGM33	854	854081	1 - 648	15 - 662	AA702486, AI630976, AW339792, AW418628, AI690212, AI350097, AA830893, AA703551, AI458500, AA936420, AW402861, and AB020714.
HPMGM54	855	577599	1 - 342	15 - 356	AL050074.
HPMGK80	856	506235	1 - 380	15 - 394	AW409684, T06413, AB003151, AP000688, and AB033064.
HPMG509	857	575951	1 - 99	15 - 113	

HPMGS24	858	796440	1 - 354	15 - 368	
HPMGT67	859	970815	1 - 111	15 - 125	
HPMGV12	860	968364	1 - 288	15 - 302	
HPMGV15	861	582596	1 - 261	15 - 275	
HPMGV59	862	577635	1 - 264	15 - 278	AW242577.
HPMGW48	863	920309	1 - 428	15 - 442	
HPMGX23	864	575903	1 - 301	15 - 315	AI806968, AI080168, AI207589, AB006572, and AF091095.
HPMHA80	865	970813	1 - 282	15 - 296	AL133605.
HPMHB74	866	577595	1 - 539	15 - 553	HO9672, and AI937462.
HPMHB83	867	531382	1 - 364	15 - 378	
HPMHC74	868	577631	1 - 357	15 - 371	AL008709, and AL020990.
HPMHD66	869	928433	1 - 429	15 - 443	AI247199, AW166611, AI254913, AA833896, AA833875, AA644090, AI818737, AL048466, AW069227, AI460050, R81017, AA613624, D44639, AA603530, AA307598, AW270385, AA634786, AI682665, AA468022, AL047349, AI687343, AI753113, AA528390, AW302017, AA707849, AA984187, AI925579, AA526724, AI084348, AI278972, AL040054, AI791150, AI867058, AA580808, AA633920, AW188742, AI634187, AI537458, AI004591, AA847499, AA639946, AA574442, AI591375, AA643770, H63092, AW305371, AA651632, AA837035, AA558560, AA862179, AI216990, AW270256, AA846959, AA581247, AI908093, AA626040, AA084609, AI469577, AI049955, AI720195, AW131043, AA314891, AA714011, AA456924, AA481887, AI732869, N23913, AA191418, AI635279, AW068316, AA452887, H15652, AI283312, AA176605, AA846944, AA904275, AA704393, N64587, AA834777, AA515728, AA601356, AI457313, AW440545, AI521525, N40092, F30158, AA493226, AA364453, AA583394, AI537020, AA229975, AA521323, AI244127, AA837671, W01985, AI962030, AI580707, AW265138, AA521399, AA086318, AI344948, AA362349, AI302994, AI524360, AA806796, AA721645, AC000025, AC004796, AC005736, AC005081, AC005899, L78810, AB026906, AC005581, AC004382, AL133448, AC006241, AC004000, U96629, AL096703, Z98884, AL133245, AL035685, AC006077, AC005844, AC004098, AC007227, AC004876, AC005746, AC004686, AL078604, AL033517, AL023807, AF196969, Z99755, AC005180, AC005800, AC016025, AL022313, AL132777, AC004253, Z97181, AC004881, Z82172, AC004973, AC004890, AC002110, AL079305, AC003663, AL132985, AC005632, AC006047, AC004019, AL031846, AC007327, Z84482, AP000313, AC002104, AC004913, AP000299, AC005102, AC004447, AC005725, AC000120, AC007666, AP000066, AC006014, Z71183, AC004476, AP000193, Z99716, U62293, Z93023, AC005619, AC000052, AL034429, AC005089, AC006441, AL031311, AC005783, AL080243, AC010170, AP000050, AF053356, AL024507, AF134726, AL035494, AC005768, AL031662, Z83844, AC005231, U47924, U41193, AC005740, AF111169, Z81364, AP000117, AP000269, AC005920, AC006197,

HPMHD71	870	760426	1 - 147	15 - 161	AP000689, AL020993, AL133445, AC004895, AC008085, AP000503, AF165926, AC002350, AL049538, AC004854, AC004859, AC007308, L81690, AC005488, AP000509, AC002470, AL121769, AL031587, AP000103, AC005943, AC004882, AF129078, U52112, AC006276, AB003151, AC005940, AL035697, AL117338, AC005972, AC000004, AC007878, AC005664, AC005690, AP000113, AC006285, AC006515, AC003101, AL022323, AF030453, AL117258, AP000045, AD000092, AL008710, Z98200, AL035458, AL109627, AC006368, AC005529, AC004383, AC005015, AC007766, AF129756, AL035691, AC005088, AC004797, AC000028, AC002492, AC003006, AC006509, AC005610, AC002303, AC008123, AL034420, L44140, S54074, AC005839, AC006059, AL049829, AL117355, AC008082, AL096701, AC006040, AC004887, AC006111, AL022163, AC006254, AC007868, AC003080, AC005527, AC005881, AL035405, AC003684, AL080316, AL008582, AC007842, Z82179, AL121603, AL023575, D84394, AL035587, AC007546, AL023879, U91319, AC005695, Z85986, AC005618, AL023584, AC005790, AC000134, AC005200, AC004752, AC007664, AC005288, D87675, AC005327, AC006064, AC008273, AC005029, AF207550, Z94801, AC002404, AC007686, AL031595, AC008127, AC018633, Z70280, AC007421, AC006547, Z47046, Z83820, AC020663, Z85987, AC003041, AC002054, AL031575, AC005229, AC005829, Y18000, AC005519, AL022328, AC007563, Z93930, AC007201, AC006468, AC005342, AL050306, AC009516, Y14768, AL133399, AP000501, AC004386, Z83826, AC005952, AC004517, AC002551, AC006539, AF157623, AL031668, AL035423, AP000122, AC005597, AC006115, and AL078587.
HPMJC01	871	914759	1 - 254	15 - 268	AC005484.
HPMJC05	872	930844	1 - 356	15 - 370	AC006977.
HPMJD88	873	930806	1 - 637	15 - 651	
HPMJE84	874	867587	1 - 411	15 - 425	AL035091.
HPMJF76	875	965642	1 - 346	15 - 360	AC005946, AL049740, AL022157, Z82211, U95626, Z83843, AC003029, and AL133162.
HPMIJ81	876	930873	1 - 310	15 - 324	AA745410, AI469172, AA341228, AW167267, AA605274, AI471543, AW173651, AI672135, AA370185, AW236342, AI284640, F37169, AI908628, AA630362, AW265393, W07122, AI281881, AI287651, AF150152, AI299050, AI648558, AA515435, AW008317, AW440976, AA100372, AA441788, C16409, AW270270, AI653905, AW162489, AI148277, AI279165, T06828, AI133164, AL120687, AA654771, AA348311, AA626404, AI802526, AA614069, F36273, AI471481, AW080120, AA204655, AI291124, AW419262, AA350859, AI291268, AI537030, AI499094, AI610159, F32894, AA747472, AA338522, AA827981, AI493217, AI446464, F18638, F03097, AW148792, AW151727, AL138265, T07324, AA515905, AA318822, AL041368, AA558015, AA381147, AA578481, H88666, T09071, AA284179, AL038474, AA604897, AI312149, AW021583, AW303876, AA346454, AI889923, AI168185,

					AI623898, TI7016, AA569468, AI583594, AA071144, AA309841, AW410400, AI971377, AI871722, AA434484, AI679706, T07287, AA601876, AW072923, AI358812, AI205084, AA071393, AI679132, AA528516, AA569187, AI754658, AI754336, AC004603, AC005392, AC005947, AC005337, AC005204, AC005772, AF111170, M87919, AC006965, AC008079, AL021332, AC002395, AF001549, U80017, AC003007, AC007684, AC008124, AC002528, AC005874, AF134471, AC005212, AC008055, AL121655, Z95124, AJ246003, AP000120, AP000167, AP000052, AL035079, AC007298, AJ010770, AC002565, AL109985, Z86064, AC004990, AC005829, AC008372, AC004013, AP000477, AC004542, AC007792, AC002045, AL096701, AC006019, AL031675, AP000065, AL033397, AL078593, AC006026, AL049851, AC005211, AL008636, AC005695, AC005356, AC006076, AC004633, AC003982, Z98200, AL008735, AC005251, AC007376, AC004690, AC004668, D84394, AC005037, AC012599, AF217403, AL079306, AC003663, AC005993, AC004986, AC007462, AC005821, AF152365, Z97054, AC007076, AC005915, AL133246, AC005341, AL109758, AL033544, AC003689, AL031053, AC006312, AC007676, U14702, AL133312, AF077058, AC005041, AC002310, AL049836, AC005541, AL049760, AC005226, U11309, AL022302, AL121654, AL080241, AL049745, AC004381, AL031391, AC004605, AL022238, AC007690, U63721, AC002543, AC007225, AC006406, AC006048, AL023284, AC006030, AL109842, AC002375, Z97635, X54175, AC005548, AC006961, AL121658, AC016027, AL136504, AC016830, AF165147, AC010206, AL035090, Z99129, AC005786, AP000244, AC004217, AC005229, AC004534, AL122003, AL133245, AC005486, AC006254, AL035073, X75335, AL049699, AC004263, S70694, AC002426, AF008191, AC008989, AL031296, AL031734, AC006270, AC005754, AC004988, AC007221, AF111168, Z84490, AC005763, AL023880, AC005255, AC005747, AL031662, U92032, Z84489, AC007285, AC002472, AC007664, AL034417, AL133244, AC005696, AC008498, AC008040, AC005385, AL031283, AL049736, AC002457, AC002049, AC005181, AP000123, AP000055, AP000170, AC004070, AC006387, Z82216, AL008720, AL132641, Z97198, Z95326, AF178030, AC007312, AF172277, AC006484, AC004810, Z84488, AL031542, AF119358, AC006044, AL117330, AL022320, AC005565, AC003119, AL031388, AC007666, AC006255, AL031678, AL035249, AC007632, AL121767, AL031176, Z68870, AC004754, Z99496, AC005912, AC009263, AC005744, AC008282, AC011718, Z69666, AL022726, AC005740, AC005602, AC006362, AC002429, AB023052, AC004099, AC003664, AC007514, AF134726, AC000070, AC000086, AC005789, AP000509, and AC005231.
HPMJN59	877	946876	1 - 547	15 - 561	AA278625, AL043338, AA417787, AI917735, AW303607, AI819365, W23045, AI243857, AA157110, and AA278626.
HPMJO46	878	922649	1 - 293	15 - 307	
HPMJR02	879	917419	1 - 505	15 - 519	AC005406.

HPMJV08	880	958001	1 - 430	15 - 444	
HPMJY55	881	922657	1 - 423	15 - 437	AC006443.
HPMKB19	882	969478	1 - 837	15 - 851	H66737, AA610385, AI825101, and AC006453.
HPMKI53	883	957997	1 - 200	15 - 214	
HPMKM81	884	894416	1 - 880	15 - 894	AW130066, AI826186, AW150146, AA129308, AW392049, AA129351, AA453884, AI278397, N24006, AA453799, AI796331, AA336728, N74882, AW380924, AA369050, AI868063, AW131507, AC004774, D31734, AF033011, U67840, L24443, AF022075, AF022077, AF022076, U25274, AF096161, L09729, U03876, Z63754, and Z63755.
HPMKM43	885	867573	1 - 626	15 - 640	AA457012, and AC002310.
HPMLE04	886	867533	1 - 562	15 - 576	N89001.
HPMLK02	887	918123	1 - 497	15 - 511	AA848128, and Z93244.
HPMLK76	888	922621	1 - 477	15 - 491	
HPMLL74	889	953069	1 - 493	15 - 507	R66945, and AI090443.
HPMLW10	890	963037	1 - 330	15 - 344	Z71183.
HPMSF86	891	509490	1 - 323	15 - 337	
HPRAE13	892	971652	1 - 461	15 - 475	AI097067, AI383144, AA370038, and AC005746.
HPRAN84	893	585489	1 - 315	15 - 329	AA370352, AA370860, AA024451, AL118518, AC007016, AF064859, AC004707, Z84718, and AP000351.
HPRAU45	894	536630	1 - 214	15 - 228	AA370859, AA370351, AC002536, and AL034371.
HPRAZ10	895	968692	1 - 452	15 - 466	AA398734, AA393413, and AA371065.
HPRBA65	896	655537	1 - 228	15 - 242	AA371132, AA371091, AW270853, AI978920, AI468384, AI971306, AA361429, and AC005156.
HPRBE36	897	655587	1 - 318	15 - 332	AA371242, AA757085, and AI018367.
HPRBL91	898	655693	1 - 286	15 - 300	AA370885, and AC002366.
HPRCB11	899	960316	1 - 338	15 - 352	
HPRCB21	900	655725	1 - 306	15 - 320	AC007198.
HPRCO08	901	939490	1 - 284	15 - 298	AA298484.
HPRCO61	902	964909	1 - 321	15 - 335	AA370278.
HPRCN41	903	655554	1 - 343	15 - 357	
HPRCU13	904	968521	1 - 265	15 - 279	AC002352.
HPRSB16	905	666295	1 - 258	15 - 272	
HPRTL26	906	849081	1 - 405	15 - 419	AA370571, and AI905054.
HPRT73	907	708761	1 - 292	15 - 306	AA369901.
HPVAB11	908	967944	1 - 567	15 - 581	AI925663, AA458636, AA193435, AA252059, W94787, AI470629, AW016321, and AA193532.

HPVAF49	909	655578	1 - 412	15 - 426	
HPVAF69	910	753744	1 - 415	15 - 429	AI584019, and R79760.
HPVAH36	911	525537	1 - 479	15 - 493	AA296794.
HPWAF85	912	655691	1 - 606	15 - 620	UI8010, AI699466, and L77587.
HPWAH48	913	655527	1 - 143	15 - 157	
HPWAS77	914	908450	1 - 725	15 - 739	AW139964, W81697, AW088477, AI887846, AA447817, AA447667, AA677404, R93353, AA831618, AA574189, AI124782, AA584550, AA055366, F13631, AA765804, AW268271, AA993918, AA679335, AC008173, AC004074, AF146367, AF124523, AF118808, AL096775, AL109954, Z83841, AC002464, AC005820, AC006048, AP000509, D84394, AC007359, AC008175, AC006499, AL136130, AL096801, and W81696.
HPWBA33	915	655733	1 - 213	15 - 227	
HPWBO84	916	867289	1 - 330	15 - 344	T65635, AI354862, AA017323, H48816, AI187056, AA829490, AA507745, T47324, AA548692, H91844, AA565232, AA640022, T08163, N22395, AA524604, AA524829, AA373304, AI818505, Z83844, AL031255, AC012384, AC004408, AC006449, AC002996, AC004149, M89651, AC005529, AC004491, AL031228, AC002357, AC002425, AC004531, AC004947, AC005837, AC004051, AL049779, U52112, AL132774, AC004690, AC005225, AC006162, AC007686, Z69303, AC006006, AC004231, AC005323, AL136295, AC002511, AF107045, AC006077, AC004596, AL050317, AL022324, AC006275, AL080245, AL035427, AL031053, AL049776, AL024507, AC005399, AC004682, AP000688, AC002375, AL078476, AL121825, AC004552, AC005839, AC007052, AC005527, AL049829, AC007055, AC003049, AP000555, and AF124730.
HPWCA53	917	657484	1 - 354	15 - 368	AI075673, and AC008015.
HPWCJ27	918	655614	1 - 344	15 - 358	
HPWCJ67	919	655560	1 - 367	15 - 381	
HPWCJ82	920	655577	1 - 472	15 - 486	T20053.
HPWDA73	921	514113	1 - 643	15 - 657	AW338702.
HPWDA86	922	961529	1 - 240	15 - 254	AW080827, AI535841, AC002038, AC002041, and AC006352.
HPWDD72	923	537333	1 - 528	15 - 542	H68009, AA532955, and AC005189.
HPWSB35	924	655713	1 - 329	15 - 343	
HPZAB38	925	655591	1 - 241	15 - 255	
HSWAC73	926	710354	1 - 396	15 - 410	AA300733, AW070249, and AC000089.
HSWAD39	927	705322	1 - 785	15 - 799	AW264269, AW028491, AA424983, AA418896, AA418895, AA460211, AI800304, AI685341, AI188340, AI160534, N26011, AW057810, and AI917673.
HSWBD86	928	785439	1 - 138	15 - 152	R59356, F10756, AA480322, AI768068, T15624, AI760446, AI870727, AA534696, AA679825, AI868057, AI274320, AA716748, AI922465, and AA907744.

HSWB040	929	711066	1 - 613	15 - 627	AI610767, AI128537, AA045673, H26372, AI564965, C00296, H27484, AA045672, and AF153882.
HSWB034	930	868007	1 - 839	15 - 853	AI264314, AI656489, AA608739, AL040264, C15165, AI922383, AA644468, AI391663, AI285883, AI538754, AI696671, AA578673, AI587042, AA843485, R27828, AI927062, AA888452, AI379567, AI093793, AA502801, H95376, AI696130, AA032171, AI697448, AA032170, N66388, AI948739, AI499520, and D60629.
HTEAA54	931	923070	1 - 694	15 - 708	AA382253, AI806382, and AI478870.
HTEAB52	932	537136	1 - 582	15 - 596	AA382333, AA382331, H52860, and AL040167.
HTEAD32	933	504353	1 - 362	15 - 376	AA382382, AA382236, and AC006305.
HTEAD95	934	961232	1 - 451	15 - 465	AA382376, AA382242, AA860376, and AC006445.
HTEAF07	935	835805	1 - 312	15 - 326	AA382453.
HTEAF26	936	537271	1 - 301	15 - 315	H53354, AA758164, AA448168, AI025042, AI829657, AA382854, AA382293, AA400727, AA442764, and AA812451.
HTEAG50	937	787500	1 - 297	15 - 311	AA382498.
HTEAK57	938	536769	1 - 411	15 - 425	H09661, AW196402, AA760720, AA432259, AI539284, AI805310, AA781214, AW268890, AI797250, AW235912, AA993321, AI017538, AW274549, AA884002, AI017535, AI217337, AW014623, AA868679, AI808721, AI769073, N62418, AI364253, AA909554, AA382799, AI917688, AA485055, AL080136, and AF079363.
HTEAL28	939	963538	1 - 666	15 - 680	AA429726, AA398189, H53400, AA382855, AA382294, AA383397, AA382295, AA382880, and Z58143.
HTEAP91	940	966113	1 - 746	15 - 760	AA411883, AW444833, AA382955, AA889519, AI217183, and AA781849.
HTEAR84	941	783328	1 - 237	15 - 251	AA382996, AA180840, AI929073, AL133353, AF132966, and X66366.
HTEAV43	942	927010	1 - 583	15 - 597	AA770016, AW195558, AA757200, AW340425, AW182241, AA383009, and AI191751.
HTEAY67	943	679390	1 - 433	15 - 447	AA383288, AL044302, AA398247, AI916926, AI970265, AA399313, AI806241, AI208574, AA994365, AA382290, and AL137385.
HTEAZ54	944	793441	1 - 499	15 - 513	AA383257, AA812455, and AL137538.
HTEBC74	945	887782	1 - 308	15 - 322	AA383466.
HTEBD35	946	967959	1 - 303	15 - 317	AA383417, and AA383322.
HTEBD40	947	779134	1 - 457	15 - 471	AA383323, AI950478, and AL121757.
HTEBJ78	948	779265	1 - 1003	15 - 1017	AA383746, AF012361, AI918814, AI638690, and AF088868.
HTEBP39	949	742218	1 - 577	15 - 591	AL040588, and AW386895.
HTEBS30	950	693377	1 - 326	15 - 340	
HTEBS77	951	953904	1 - 592	15 - 606	AA102609, AA903522, AA810166, AI887877, AA928872, AI912645, AI628759, AI652056, AA372813, AA326308, AA313595, AA252658, AA491058, AA205648, AW375850, AA252657, and AA082983.

HTEBS80	952	854052	1 - 381	15 - 395	AA399558.
HTEBX62	953	508150	1 - 404	15 - 418	AL133028, and AB033037.
HTEBY08	954	960427	1 - 344	15 - 358	M78063, A1560292, H50301, AA340759, AA340760, H45375, U09355, and AF096153.
HTEBY15	955	526281	1 - 252	15 - 266	
HTEBY28	956	923026	1 - 609	15 - 623	AB033083.
HTEBY41	957	711523	1 - 230	15 - 244	
HTEBY61	958	967340	1 - 421	15 - 435	AA725713, AL040570, R48431, and AC020663.
HTEBZ21	959	958381	1 - 340	15 - 354	AF193806.
HTECA13	960	507053	1 - 393	15 - 407	AA382976.
HTECA16	961	764416	1 - 482	15 - 496	A1017997.
HTECA21	962	911369	1 - 688	15 - 702	R20356, H09898, and R13239.
HTECA32	963	947605	1 - 779	15 - 793	
HTECA51	964	708860	1 - 414	15 - 428	A1479803, R89200, AA382300, AA700729, and AL035450.
HTECA83	965	870692	1 - 446	15 - 460	
HTECB21	966	921070	1 - 359	15 - 373	
HTECC13	967	971673	1 - 301	15 - 315	
HTECC20	968	963353	1 - 993	15 - 1007	AI521186, AI287890, AW006015, AI739342, AI536021, AI915154, D59412, AI382968, AA723799, C14160, and R58305.
HTECC37	969	508143	1 - 317	15 - 331	
HTECC38	970	844558	1 - 553	15 - 567	AL042436, AI125824, AA437087, AI028669, AI024321, AW241753, AA400083, AA953011, AA972296, AI674705, and AL042437.
HTECC66	971	790937	1 - 409	15 - 423	AW375961, H12646, N46186, AI114644, AA133382, AA314626, T92864, AA482645, AA203566, W20194, AA878228, W80608, AA699466, AA482495, Z25122, AA490161, AA939181, AI635552, and AF113691.
HTECC80	972	796820	1 - 446	15 - 460	AL079435, AW070333, AA868621, AI024608, AI208541, AA644440, AA992264, AI219709, and AL078621.
HTECC85	973	508138	1 - 337	15 - 351	AA219332, and AW274715.
HTECC96	974	959874	1 - 547	15 - 561	AL039822.
HTECD17	975	508108	1 - 397	15 - 411	Z68165.
HTECD18	976	973163	1 - 614	15 - 628	T36107, T19204, AF012359, and T36109.
HTECD36	977	518124	1 - 421	15 - 435	AL079683, T69495, AA377984, AA411067, W19966, AL135463, AA152011, AI080369, AI928496, AI969686, AW150086, AW162108, AW245409, AW245596, AW087350, AI660688, AW025370, AI986318, AA417624, AW073180, R65681, AA609692, AI568566, AF015913, and AF167572.
HTECD62	978	527207	1 - 242	15 - 256	AI018016, AA927826, AA781742, AI206323, and AI699610.

HTECD75	979	727422	1 - 410	15 - 424	AA770236.
HTECE09	980	620494	1 - 363	15 - 377	AA074745, AA311579, AW369123, AW377808, AW369199, AA305128, AA279742, AA382491, AA457232, AA350374, and AF119664.
HTECE44	981	764830	1 - 349	15 - 363	AI016755, AA626104, AI215071, AI968379, AA506126, AI340264, AI214879, AI653073, AI208052, AW235456, and AA609852.
HTECE45	982	790894	1 - 349	15 - 363	AA702149, AI760177, W87526, AL042666, AA721639, AA721643, and R55626.
HTECE69	983	522983	1 - 340	15 - 354	AA209512, and AF084521.
HTECE91	984	522984	1 - 283	15 - 297	
HTEDF13	985	522964	1 - 370	15 - 384	
HTEDF23	986	522966	1 - 319	15 - 333	
HTEDF57	987	964734	1 - 467	15 - 481	AA206531, AA205273, AF134584, AF133655, R57172, AA370673, AL049834, AF144487, and AF144488.
HTEDF76	988	522973	1 - 371	15 - 385	
HTEDG16	989	925527	1 - 1246	15 - 1260	AI341284, AA954970, AA971333, AI656306, AI341232, AI962769, AI970130, AI015246, AI149570, AW236864, AI187784, AI824998, AI699532, AW087767, AA776716, AA758202, H75549, AI282907, and AC003691.
HTEDG34	990	761752	1 - 601	15 - 615	A65985.
HTEDH21	991	522764	1 - 307	15 - 321	AW237166, and AI806759.
HTEDH22	992	522765	1 - 412	15 - 426	AA884595, AI004070, AI652358, AI933335, and AC006012.
HTEDH54	993	957762	1 - 398	15 - 412	AI142272, AW303480, and AL117355.
HTEDI02	994	921243	1 - 693	15 - 707	AW166305.
HTEDI16	995	932292	1 - 830	15 - 844	AI200759, N35603, and AI806635.
HTEDI82	996	536477	1 - 536	15 - 550	
HTEDJ04	997	519940	1 - 151	15 - 165	
HTEDJ30	998	771404	1 - 576	15 - 590	AA938733, AI830416, H99099, AI768985, AA410878, AA969071, AI220012, AI568973, AI354321, AW130634, AI219538, AI280159, AI751123, AI693274, and Z61810.
HTEDM08	999	960303	1 - 243	15 - 257	AA383292, and AA010475.
HTEDO31	1000	870711	1 - 279	15 - 293	
HTEDO51	1001	530592	1 - 336	15 - 350	
HTEDO59	1002	964379	1 - 277	15 - 291	AI050310.
HTEDP15	1003	870675	1 - 309	15 - 323	AC008119.
HTEDP31	1004	870548	1 - 526	15 - 540	AC004674.
HTEDP32	1005	839532	1 - 412	15 - 426	
HTEDP83	1006	536821	1 - 391	15 - 405	AA382559.
HTEDQ30	1007	530589	1 - 192	15 - 206	AA470110.

HTEDQ72	1008	795332	1 - 463	15 - 477	AA424209.
HTEDQ83	1009	530586	1 - 493	15 - 507	
HTEDR71	1010	761585	1 - 303	15 - 317	AJ003479, AJ003512, AJ003478, AJ239328, and AP000219.
HTEDR91	1011	530451	1 - 363	15 - 377	AA778548.
HTEDU45	1012	870708	1 - 1168	15 - 1182	AA401417, AI654822, AA131789, AA401393, AA040136, AA030057, AA040089, AW002428, AA131796, AI809387, AI208853, AI798677, AI808134, AA028977, AA131846, and AI468240.
HTEDU48	1013	932315	1 - 718	15 - 732	
HTEDV02	1014	921114	1 - 152	15 - 166	
HTEDX22	1015	523959	1 - 552	15 - 566	T64832, Z45475, and F12119.
HTEDX55	1016	530452	1 - 345	15 - 359	AL035450.
HTEDY38	1017	771505	1 - 128	15 - 142	
HTEDY54	1018	922964	1 - 845	15 - 859	
HTEDY57	1019	530580	1 - 314	15 - 328	
HTEEA03	1020	925399	1 - 227	15 - 241	
HTEEB18	1021	523962	1 - 537	15 - 551	AA995142, AC005661, and Z65242.
HTEEB33	1022	924818	1 - 601	15 - 615	AL049780, and AC007055.
HTEEC10	1023	968517	1 - 353	15 - 367	
HTEEB65	1024	530157	1 - 372	15 - 386	AI243357, AI126440, AI693753, and AA783013.
HTEEF31	1025	924840	1 - 333	15 - 347	
HTEEH31	1026	507814	1 - 279	15 - 293	
HTEEU23	1027	524059	1 - 314	15 - 328	
HTEEU52	1028	530199	1 - 331	15 - 345	AL040261, AI525252, and AI025700.
HTEEU88	1029	698315	1 - 355	15 - 369	AA383576, T04917, T35202, AI422683, AI694269, AW341450, AW172298, AI253197, AI392973, AI817020, AI675030, AW149563, AI830691, AI288333, AI420397, AI768573, AW300444, AW271819, AI862664, AW165982, AI761400, AI826256, AI368689, AI697857, AI889625, AI972408, AI357436, AI421517, AI651095, AI283759, AI634398, AI523543, AI948511, AW196914, AI992087, AI417903, AI827278, AI927043, AW237591, AI831948, AI831197, AI830712, AW085599, AI375540, AI300150, AI936396, AI082343, AI190058, AI369782, AA937125, AI926819, AA872799, AI831516, AA502373, AI823952, AI262912, and AL035461.
HTEEU92	1030	960127	1 - 471	15 - 485	AI005426.
HTEEV53	1031	523957	1 - 298	15 - 312	
HTEEW73	1032	917206	1 - 862	15 - 876	AI125404, AI247364, AI208217, AA910021, AI915307, and T11495.
HTEEZ95	1033	530095	1 - 134	15 - 148	
HTEFJ53	1034	935982	1 - 210	15 - 224	

HTEFM31	1035	771355	1 - 449	15 - 463	AL137385.
HTEFN15	1036	959854	1 - 480	15 - 494	
HTEFO32	1037	529272	1 - 137	15 - 151	
HTEFO76	1038	770270	1 - 404	15 - 418	
HTEFPI4	1039	659369	1 - 289	15 - 303	AL080239, and AL030997.
HTEFP50	1040	507219	1 - 398	15 - 412	AI733211, AA977235, and AI793144.
HTEFP61	1041	711399	1 - 339	15 - 353	
HTEFS60	1042	836010	1 - 308	15 - 322	Z84469.
HTEFU46	1043	920604	1 - 182	15 - 196	
HTEFW55	1044	787550	1 - 720	15 - 734	Z20330.
HTEFW56	1045	528019	1 - 344	15 - 358	
HTEFW78	1046	961061	1 - 327	15 - 341	AA416708.
HTEFX53	1047	842047	1 - 301	15 - 315	
HTEGA13	1048	656077	1 - 260	15 - 274	AA304950, and AC005237.
HTEGA17	1049	964198	1 - 1718	15 - 1732	AA861754, AI041049, AA974148, AI025824, AI015271, AA973722, AI262750, AF012394, H44966, H45019, H65081, H65128, H65081, N30790, N32825, N41565, AA021000, AA037708, AA158991, AA158990, AA552704, AA581540, AA583387, AA594383, AA568601, AA639650, AA962753, AI076864, C01177, C17452, AA610069, AA677739, AA678002, Z17891, Z17844, Z17858, D29489, D31204, D31401, D31430, AI147272, AI348141, AI434148, AI446782, AI401705, AI473505, AI475244, AI560742, AI565331, AI479120, AI567547, AI569204, AI570723, AI571642, AI521092, AI587097, AI619824, AI619826, AI683822, AI745345, AI700348, AI862997, AI891040, AI805378, AI805561, AI814808, AI917522, AI924990, AI925791, AI925824, AI926709, AI932677, AW008971, AW025107, AW028354, AW028895, and AW044371.
HTEGA43	1050	715583	1 - 293	15 - 307	
HTEGA47	1051	503300	1 - 305	15 - 319	AA469976, and AA382993.
HTEGD11	1052	967698	1 - 454	15 - 468	AI739081.
HTEGE44	1053	528017	1 - 460	15 - 474	
HTEGF78	1054	614242	1 - 394	15 - 408	AA320491, AA461257, T96959, AA620998, AI803092, AI598264, AI802911, AA613500, AI701066, AA873354, AA976002, AI337726, AI401363, AA889162, AW449691, AA460950, AI435494, T91835, N47591, T08650, AI672896, AI015106, AI122076, AF082179, AF173643, and AF088884.
HTEGF95	1055	796660	1 - 264	15 - 278	AI809182, and AI014526.
HTEGG07	1056	954115	1 - 450	15 - 464	
HTEGG61	1057	528007	1 - 203	15 - 217	

HTEGK51	1058	520046	1 - 137	15 - 151	AA496105, AL038451, AA020916, AA214222, AL038833, AW239553, AL038903, AL036026, W94506, H11258, H19187, T09424, AW163336, AA084982, AA853848, AA852612, AA134785, T30709, T31235, R13838, T30596, T31277, T32509, F08351, T30996, R61645, AI002404, AA281162, N33973, W63690, AA056138, AA400554, AA224046, AW160678, AA252722, AA308905, H37946, AA159207, AA337592, H15180, N36548, T78050, AI214139, H45908, AL036764, AL038918, AA486190, N99529, AA176166, T29922, AA173378, AI929392, AA993699, T32147, W92551, AA314753, W20343, AI028519, W52361, R12459, R17656, D30841, D56168, AA018894, AW375983, AA318870, R57052, AA083038, AA018506, AA401854, W94711, H82178, AB014888, AB015799, AF075601, AF060703, AB015798, AF080569, AB028854, and AF035962.
HTEGN63	1060	520037	1 - 196	15 - 210	AB007131, AP001052, and AP001051.
HTEGO05	1061	932583	1 - 1086	15 - 1100	AA059465, AA059211, AA731209, AA236961, T86500, T87461, AL024498, and M35862.
HTEGQ21	1062	923059	1 - 419	15 - 433	AA382826, AA382492, AI917341, AI967930, AI990328, AI041198, AW135194, AI936466, AI990195, AI336861, AI825657, AA609860, AI652939, AI950262, and AI968690.
HTEGQ74	1063	573865	1 - 358	15 - 372	
HTEGR56	1064	959871	1 - 186	15 - 200	
HTEGR88	1065	871611	1 - 405	15 - 419	AL133660.
HTEGS16	1066	527914	1 - 340	15 - 354	
HTEGS34	1067	458520	1 - 391	15 - 405	D80168, D59627, C14298, D51079, D59695, D52291, D80949, AW360780, D59503, D51213, C14227, D80290, C14389, AW377669, AW352172, T11417, D80258, D80064, D58246, D59889, D52059, D45273, D80014, D80391, AW377661, D59787, D80196, D57483, T03048, C16955, AI557751, D59484, AI535686, Z33452, C06015, AI557774, T02974, C04682, AA514184, H67854, H67866, AI525216, AI525228, D51053, AI535961, D80251, N66429, AI525969, AI525238, AI525222, AI525227, AB010386, AR016808, U37689, I81198, X64588, I82446, AB019242, and A47134.
HTEGS93	1068	506653	1 - 395	15 - 409	
HTEGT29	1069	870638	1 - 463	15 - 477	AA610046, AA725767, AA609763, AA694482, AI674115, and AI222344.
HTEGT33	1070	716783	1 - 505	15 - 519	AA459933, and AA460208.
HTEGU13	1071	520041	1 - 380	15 - 394	AA725598, AA437008, AA758847, and AA383617.
HTEGU32	1072	524053	1 - 492	15 - 506	AI208922, AF012358, AC000359, AF176024, and AC000357.
HTEGU62	1073	573885	1 - 307	15 - 321	
HTEGU93	1074	764831	1 - 721	15 - 735	AL037365, AI968379, AA397716, AI016755, AI340264, AA626104, AA435927, AA506126, and AL133624.
HTEGV08	1075	959888	1 - 425	15 - 439	AP000275, AP000105, AP000037, and AC002452.
HTEGV60	1076	822954	1 - 484	15 - 498	AA210913.

HTEGV84	1077	870240	1 - 759	15 - 773	AI809518, AA725632, AA400546, AW303510, AA621301, AA400438, AI184200, AI016652, AI698674, AA758091, AA757258, AA725799, and AA705799.
HTEGW41	1078	573880	1 - 406	15 - 420	AF169385, and AF149310.
HTEGW94	1079	794350	1 - 526	15 - 540	
HTEGX74	1080	783829	1 - 544	15 - 558	AA789286, AI339366, AI656082, AA861573, AA416690, AI808240, AA889130, and AI216654.
HTEGY01	1081	917214	1 - 438	15 - 452	
HTEGY85	1082	573849	1 - 300	15 - 314	AL080197, AP000346, and AL022324.
HTEHB07	1083	870707	1 - 336	15 - 350	AA383326, and AI672505.
HTEHC20	1084	526704	1 - 313	15 - 327	Z98752.
HTEHC47	1085	973071	1 - 723	15 - 737	AA436088, AI149899, AI002083, AA411806, AA470059, AA781801, AA416972, AA435988, AA758635, and AA707529.
HTEHC60	1086	965998	1 - 610	15 - 624	
HTEHC78	1087	573882	1 - 332	15 - 346	
HTEHE60	1088	795264	1 - 551	15 - 565	
HTEHE67	1089	784926	1 - 677	15 - 691	AI018790, AA885492, AI377750, AW340453, and AC007114.
HTEHE78	1090	932312	1 - 357	15 - 371	AA421403, AA411967, AA412565, AI825585, AW136990, AI962705, AI825455, and AA89516.
					AA642104, AA664126, N66948, AI753334, N70325, AA601713, AA320178, H53040, AA577770, H53039, AA515742, AI222360, AA837716, AI109628, AC006064, AL022721, AP001052, AC004694, AI109801, AI117258, AI109759, AC004884, AC005476, Z95116, AL022159, AC005015, AC003101, AL035086, Z99943, U91323, U91318, AC007773, AC005261, AC002350, AL031289, AC005081, AC005529, U73640, AC005552, AC007040, AL133244, AC006163, AC007285, AC007057, AL121655, AC006324, AR036572, AP000092, AC005829, AI132777, AP000512, AC000025, AF107257, AC005520, AF107258, AP000236, AC004814, AC006581, AC010168, AC005790, AL049759, AC005519, AL022316, AC004100, AL031427, AC007688, AL031584, AC009516, AC006449, AC006441, AC005387, AP000501, AL121652, AP000510, AL049539, U91321, AC003071, AC004908, AC005921, AD001527, AC005800, Z92542, AL034548, AF196969, AC004552, AC009181, AC005971, AC004966, AC004815, AL031681, AC007617, AF196779, AC004707, AB023050, Z83844, AC002312, Z82190, AC007172, AC004990, AC002565, AC007386, AF134726, AL034549, Z82208, Z95329, AC005037, AC007637, AC005162, AL031680, AL022165, AF026069, Z97184, AC006966, and AC003086.
HTEHE91	1091	790342	1 - 520	15 - 534	AI653740, AI223017, AA393574, AP000346, AL022324, and AL080197.
HTEHF13	1092	667224	1 - 319	15 - 333	
HTEHF66	1093	836999	1 - 424	15 - 438	AL137678, and AL109657.
HTEHG44	1094	933624	1 - 682	15 - 696	AA446074, AI224924, and AA868166.

HTEHI06	1095	935984	1 - 817	15 - 831	AA394226, AA398139, AA025620, AA451812, AA454022, and AC012599.
HTEHI14	1096	526687	1 - 444	15 - 458	
HTEHI54	1097	533960	1 - 338	15 - 352	R19058, Z44007, F06961, and F05366.
HTEHI62	1098	922559	1 - 390	15 - 404	AI202243, AA687318, and AI184808.
HTEHI93	1099	870629	1 - 317	15 - 331	
HTEHI64	1100	530749	1 - 235	15 - 249	
HTEHK40	1101	660875	1 - 317	15 - 331	
HTEHK70	1102	771432	1 - 430	15 - 444	
HTEHK81	1103	573866	1 - 414	15 - 428	
HTEHL96	1104	573859	1 - 390	15 - 404	AA926746.
HTEHO56	1105	787521	1 - 664	15 - 678	AL042716, AI634081, AI656008, AI383457, AA298264, AW274940, AW183456, AI824911, H48934, and AI015007.
HTEHP02	1106	920625	1 - 429	15 - 443	
HTEHP20	1107	967443	1 - 379	15 - 393	AA393345, AI018421, AI018412, and AI621296.
HTEHP50	1108	531505	1 - 219	15 - 233	
HTEHP60	1109	573853	1 - 439	15 - 453	
HTEHP67	1110	751866	1 - 425	15 - 439	AA429653, and AL137385.
HTEHP80	1111	573830	1 - 354	15 - 368	AL042482.
HTEHR83	1112	573841	1 - 260	15 - 274	AW117582, and AW275130.
HTEHS19	1113	529280	1 - 324	15 - 338	
HTEHU20	1114	573813	1 - 345	15 - 359	AA625735, and AI205755.
HTEHU68	1115	786378	1 - 362	15 - 376	AI808748, and AA868749.
HTEHU73	1116	870083	1 - 377	15 - 391	
HTEHV72	1117	920610	1 - 356	15 - 370	AA449587, Z62660, and Z62661.
HTEHV86	1118	785652	1 - 454	15 - 468	AB007926.
HTEHW03	1119	924832	1 - 439	15 - 453	
HTEHW21	1120	760552	1 - 286	15 - 300	H99838, AL037447, H98172, R99332, and N73909.
HTEHX03	1121	924826	1 - 502	15 - 516	AI198906, AI743542, AI807563, AI392615, AI813744, AI150517, and AI150519.
HTEHX32	1122	772643	1 - 440	15 - 454	AI699984, AA470157, AI018717, AI917728, AA398746, AA393334, AI216704, AA868127, and AL049742.
HTEHX51	1123	668553	1 - 200	15 - 214	AC004148.
HTEHX92	1124	527167	1 - 477	15 - 491	
HTEIA60	1125	859130	1 - 442	15 - 456	AA594897, Z46029, AA316462, T27008, AA306099, F12789, R05542, AA635902, T75086, T35592, AW378962, R28411, AA740171, T52620, AL021707, and AJ236698.
HTEIA80	1126	721831	1 - 265	15 - 279	

HTEIB14	1127	963099	1 - 700	15 - 714	AI126171, AW172978, AI802445, AI811298, AI807074, AI635206, W96514, AI624106, AI190433, AI810701, AL043767, H43143, AI271523, AI911113, AA644026, AI803788, AI566934, AI187824, AA043579, AI869010, AI015017, and R55050.
HTEIF40	1128	958355	1 - 578	15 - 592	AI806847, AA431560, AI219847, AA913948, AI633873, AI638029, AW003193, AI990760, AA861291, AI190550, and AI187284.
HTEIF68	1129	573828	1 - 263	15 - 277	AA383150.
HTEIG32	1130	699470	1 - 313	15 - 327	
HTEIH70	1131	573826	1 - 186	15 - 200	
HTEIJ17	1132	520113	1 - 425	15 - 439	AF088868.
HTEIJ41	1133	712520	1 - 347	15 - 361	AA037622, AA151557, AA884833, and AI027960.
HTEIJ73	1134	958241	1 - 322	15 - 336	
HTEIJ77	1135	772402	1 - 55	15 - 69	
HTEIK11	1136	967431	1 - 465	15 - 479	AA370836.
HTEIK70	1137	530454	1 - 107	15 - 121	
HTEIK90	1138	789121	1 - 383	15 - 397	AL133625, and AL050310.
HTEIL07	1139	953803	1 - 445	15 - 459	H55431, and AL031843.
HTEIL48	1140	523681	1 - 302	15 - 316	
HTEIL70	1141	520045	1 - 515	15 - 529	AA383469, and AW340027.
HTEIL71	1142	760551	1 - 418	15 - 432	AW374031, AI376865, AA610337, AL031277, AC004159, AL035073, Z83838, AC011422, and AL031286.
HTEIN68	1143	753210	1 - 333	15 - 347	
HTEIN95	1144	839884	1 - 602	15 - 616	AI638483.
HTEIO02	1145	920622	1 - 365	15 - 379	AW188204, and AL078587.
HTEIO12	1146	653244	1 - 322	15 - 336	
HTEIO28	1147	573803	1 - 344	15 - 358	
HTEIP88	1148	941155	1 - 253	15 - 267	
HTEIP92	1149	523892	1 - 356	15 - 370	
HTEIQ74	1150	765794	1 - 576	15 - 590	AA905565.
HTEIR33	1151	928058	1 - 504	15 - 518	AI041198, AW135194, AI336861, AI917341, AI825657, AI936466, AI967930, AI990195, AI990328, AA609860, AI652939, AI950262, AI968690, AW043968, AI695938, AI918858, AI207159, AI961172, AI635425, AA382492, AA382826, and Z54930.
HTEIS65	1152	573775	1 - 444	15 - 458	
HTEIU75	1153	779163	1 - 535	15 - 549	
HTEIU92	1154	870652	1 - 390	15 - 404	
HTEIV54	1155	922027	1 - 859	15 - 873	AA608560, AW119083, AI805320, AW241508, AA478132, AI935179, AA478131, AW241453,

						AI148017, AA496125, AI159761, AI290727, AA757496, AI039534, AA410246, AW015244, AA991785, AI299213, AI191790, F32781, H53433, AA708313, AA757725, AA987362, AI018579, AI824880, AI989666, AI950419, H53434, AI703120, AA436358, AA410593, AA410594, AI205656, AA404329, AA404331, AI147261, AA935676, AA708988, and AF163095.
HTEIV86	1156	784657	1 - 476	15 - 490		AA884237, and Z66028.
HTEIW27	1157	829698	1 - 790	15 - 804		AL040266, AA045127, H71355, AA070703, AA036715, AA325559, AA043642, AA196645, H94227, AA305440, AA383234, H61672, H06121, R60099, AL042836, AI016643, AW410572, AL042837, and AI018804.
HTEIW37	1158	573891	1 - 340	15 - 354		
HTEIX28	1159	836011	1 - 725	15 - 739		AA878363, AL040461, AI806762, AL040944, N48708, AA961620, AI015474, AI122718, AI674958, AI925550, AA316256, AA846418, AI270517, AA383573, AW087494, Z40157, AA915976, AA927218, AA912892, AI216366, D20536, AI109748, and AL078614.
HTEIX85	1160	864251	1 - 364	15 - 378		AI143096, AA476476, AF112968, and AF133914.
HTEIY52	1161	963536	1 - 365	15 - 379		
HTEIY69	1162	577783	1 - 342	15 - 356		AA860220, AA373213, AA095300, AA294896, AA056395, AW369291, AA081316, AA081068, AA258633, AA491648, T78543, AI565548, T68394, D81309, AA303509, C02623, AA552624, C15625, W65448, and H56519.
						AI206714, AI962380, AW139167, AI341507, AW197295, AF146793, and AC004673.
HTEIY80	1163	955242	1 - 640	15 - 654		
HTEIZ76	1164	523764	1 - 373	15 - 387		
HTEJB20	1165	528015	1 - 336	15 - 350		AW119138, AA508616, and AC000386.
HTEJB25	1166	530590	1 - 364	15 - 378		AI804160, AI287878, AA400787, AI003207, AF176315, AF042089, AC007040, AC000385, and AC004967.
						AC005230, and AL031230.
HTEJB81	1167	870644	1 - 326	15 - 340		
HTEJC28	1168	573774	1 - 292	15 - 306		
HTEJC95	1169	772989	1 - 412	15 - 426		
HTEJE15	1170	908360	1 - 577	15 - 591		AI217144, AA399611, AA398976, AI025074, AA758412, AW449170, AI953070, AI337133, AI654417, AA608877, AI969018, AA400066, AA401568, AL137462, and S75275.
						AA383469.
HTEJE50	1171	520049	1 - 410	15 - 424		
HTEJF45	1172	942476	1 - 704	15 - 718		AA927155, AI989936, AI870479, AW196902, and AW137017.
HTEJG24	1173	526278	1 - 432	15 - 446		
HTEJH43	1174	774243	1 - 505	15 - 519		
HTEJL21	1175	573742	1 - 460	15 - 474		AA913820, AW138390, W37338, AI139797, AW135343, AA776708, AA621016, AW274952, AI623224, AI125250, AA778537, AI208106, AI637631, AW341652, AA776715, AI204215, AA609761, AI671266, AI023591, AI950399, AA758819, AW104292, AI188024, AW058598,

HTEJM56	1176	952255	1 - 392	15 - 406	AA460183, AI969065, W37337, and AA824405. AL042395, AA504349, AI693474, AI125391, AL041671, AW168041, AA838043, AI990015, AI864457, AI149664, AI738586, AL041569, AW294188, AI805280, AA579771, AW273185, AI653680, AW197733, AI138789, AI699335, AI475427, AA883961, AI203057, AI968077, AA383594, AA976749, AI648684, AI952360, AI680162, AI590021, AW076093, AW264516, AI073952, AI568870, AI564719, AI623828, AA808060, AI683684, AI866457, AI628292, AW196868, AW075413, AI590686, AI867042, AI922365, AW081255, AI285586, AI249375, AI610293, AW103878, AI915576, AW403717, AI475455, AI811860, AI282903, AI539808, AI873644, AI174394, AI469811, AI831140, AI872910, AI690585, AI539829, AI863191, AI613270, AI625464, AI281660, AI870187, AI886022, AI269862, AI624293, AI920833, AI680498, AI934259, AI610114, AW193026, AL121270, AI289337, AW075657, AI364788, AI383919, AW168723, AI922901, AI636719, AW073697, AI863321, AI270055, AI633073, AI624543, AI610645, AI702433, AI611743, AI690312, AL039276, AI689420, AL045500, AW080992, AI687065, AI432040, AL048656, AI819326, AW238730, AI445976, AI744256, AA572758, AL045163, AI627880, AI866741, AI805385, AI612721, AL119791, AW079159, AI343059, AI619716, AI828731, AI612759, AW089179, AW151729, AI696819, AI870192, AI567351, AI349933, AI934011, AI280661, AI699011, AI537617, AI919345, AI251830, AW088899, AI366549, AI539153, AW088144, AL036214, AI866608, AI859464, AI866585, AI499986, AW149236, AW083804, AI862144, AW170734, AI696626, AL040241, AI554821, AI589993, AW059713, AI921082, AL038445, AW168425, AI345111, AI446373, AI358701, AL036638, AI537677, AI621179, AI433157, AL041150, AI537837, AI159837, AI874351, AL038882, AI520785, AI609059, AI344817, AI539771, AI798258, AI922577, AI471361, AI500659, AI288285, AI889168, AI344935, AI866573, AW068845, AW103228, AL045620, AI476109, AI815232, AI801325, AI500706, AI445237, AI491776, AI758613, AW151138, AI582932, AI284517, AA613907, AI500706, AI445237, AI491776, AI758613, AW151138, AL042628, AI521560, AI889189, AI500662, AI284509, AI439452, AI857724, AW148320, AI633493, AW169653, AI434256, AI344785, AI249962, AL041772, AI609677, AI888661, AI811344, AI284513, AI620284, AI888118, AI349614, AI872051, AI589273, AI866510, AI569583, AW302992, AI801112, AW088903, AI440252, AI800152, AI963068, AI569632, AI274769, AI348854, AL036664, AW023590, AI608676, AI345471, AW088134, AA579232, AA494167, AW075084, AI468872, AA420722, AI537307, AL120853, AL040243, AI251205, AI924971, AI287489, AI698401, AI524607, AI683714, AL043632, AL043326, AI538342, N71180, AI433976, AC003688, AF096834, AF073955, AF073954, AL117585, S68736, A08916, A08910, AR000496, U39656, A08909, I48978, I89947, A08913, U72620, I89931, I49625, AL049382, AF090896, AL080060, I26207, AL137556, AL137283, AF113676, AL137538, AF104032, AB019565, A93350, X93495, AF158248, AL122093, AL137527, AL050393,
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HTEJN10	1177	958389	1 - 412	15 - 426	AA397714, and AL688816.
HTEJN49	1178	558383	1 - 244	15 - 258	AL033527.
HTEJN96	1179	573845	1 - 341	15 - 355	
HTEJP10	1180	914785	1 - 406	15 - 420	AA173098, AA330453, N72370, AA382609, D82507, AA305139, AA376308, AA319043, AA360655, AA204809, N47351, L48818, T97397, H74112, AA303102, N98390, T85235, R92534, AL400282, W78773, AA226439, N77177, AA135383, AA089951, N28003, AA094694, AA036797, and D82374.
HTEJP66	1181	916481	1 - 697	15 - 711	AW402599, AA402458, N28458, W04863, AA683291, C17218, AA452695, AA321934, AA325890, AA148436, AA083939, W95796, AA203350, AA373216, H87410, R96313, N29206, W60562, N55788, W32702, N40125, AA319796, T27329, AA360583, H49227, AA402577,

HTEJP71	1182	767955	1 - 616	15 - 630	AA027923, AA115050, AA150348, AA496191, W05840, N35260, AA382795, AA210879, AA346660, AI092181, AF172940, AF151885, and AC007298.
HTEJT37	1183	530596	1 - 339	15 - 353	H59767, AA252573, R52747, AW303359, AW151618, AA811707, AA939308, AI205601, and X80437.
HTEJT74	1184	676254	1 - 438	15 - 452	AI092208.
HTEJU30	1185	573823	1 - 304	15 - 318	AA393248, AA393292, AI796754, AA293815, AA459841, AI075905, AW137492, AI652522, AI217933, AI150346, AI694956, AA399502, AA398164, AI024099, AA719008, AA629029, AA861041, AA402463, AA435622, R24468, R66361, AA688372, AF081250, and AF081249.
HTEJV62	1186	694525	1 - 325	15 - 339	AC000093.
HTEJX78	1187	806395	1 - 411	15 - 425	AA813665, AI025041, and AI215603.
HTEJY21	1188	530156	1 - 426	15 - 440	AA496111, AW138142, AA306268, AA417106, AA382596, AI027705, AA383788, AI824924, AA382469, AA812546, AA382920, AI183592, AA383156, and AI828862.
HTEJY27	1189	685272	1 - 239	15 - 253	AI695191.
HTEJZ26	1190	523818	1 - 262	15 - 276	AA853991, AA778707, AW182416, AA634398, and AA609856.
HTEKC07	1191	920925	1 - 389	15 - 403	AW247046, AA401701, and AA398161.
HTEKC12	1192	815975	1 - 345	15 - 359	AW087802.
HTEKD04	1193	519938	1 - 418	15 - 432	AI539455, AI218279, AI348415, AW408773, AW340548, AI368160, AA894774, AA937067, and AW364691.
HTEKE41	1194	974044	1 - 735	15 - 749	AI091681, AC009405, AC003683, AI239321, AC007253, AL009173, AL030995, Z99572, and AL109853.
HTEKE46	1195	870084	1 - 1112	15 - 1126	AI125483, W77994, AI161017, W73951, AI250771, AA777158, W94063, AA912611, AA339877, AI265865, and AA339786.
HTEKE80	1196	790381	1 - 523	15 - 537	
HTEKF04	1197	774260	1 - 732	15 - 746	AA609512, AW074860, AW119172, AA626238, AA759162, AA609090, AA421396, AW070485, AA421292, AW303549, and AC007999.
HTEKF24	1198	573750	1 - 412	15 - 426	AF001846.
HTEKF35	1199	573749	1 - 253	15 - 267	
HTEKF68	1200	772997	1 - 567	15 - 581	AW263561, AW183891, AI005584, AI216442, AA983878, AA815385, AA868890, and AI004495.
HTEKI01	1201	917176	1 - 416	15 - 430	
HTEKI70	1202	503039	1 - 686	15 - 700	AI830436, AA187445, AA383192, H91927, AI640587, and AI989949.
HTEKI48	1203	530588	1 - 235	15 - 249	
HTEKM14	1204	745257	1 - 312	15 - 326	
HTEKO49	1205	723148	1 - 383	15 - 397	AA699599, AI275162, N27054, R09201, and AC006211.

HTEKQ26	1206	870627	1 - 314	15 - 328	
HTEKQ85	1207	784444	1 - 555	15 - 569	
HTEKR75	1208	870555	1 - 412	15 - 426	
HTEKS15	1209	529273	1 - 414	15 - 428	
HTEKS20	1210	846714	1 - 1063	15 - 1077	AI936596, AA868353, AI797296, AA725553, AI221970, AA429551, AA428462, AA629305, AA629047, AA431190, AI073397, AW233895, AI123443, AI808267, AA609412, AI914363, AA953895, AI214385, AA431516, AA911681, AA781953, AI825106, AA298758, AI215028, AA909534, AA723768, DI0393, and S63991.
HTEKS21	1211	506651	1 - 333	15 - 347	
HTEKS76	1212	767658	1 - 495	15 - 509	AI990484, AI917746, AW182169, AI216456, AA723388, AI018419, and AA969884.
HTEKX06	1213	935945	1 - 426	15 - 440	
HTEKX08	1214	959876	1 - 490	15 - 504	AL042392, AI147451, AA758821, AW450252, AA399310, AI656343, AI636668, AI190733, AA725709, AI025812, AA398244, AA723645, AA382463, AA709253, AI139837, AA401777, and A57391.
					AA393705.
HTEKX28	1215	920927	1 - 286	15 - 300	
HTEKX70	1216	573700	1 - 304	15 - 318	
HTEKZ50	1217	524054	1 - 304	15 - 318	H89084, AA296876, AL023876, AC011422, AP000962, AL020989, AL049563, AL022575, AL031183, AL009028, AL031391, and AC002487.
HTELA50	1218	774268	1 - 497	15 - 511	AI670826, AA058736, and Z99297.
HTELD47	1219	934272	1 - 1005	15 - 1019	AA229071, and AA229024.
HTELD82	1220	779315	1 - 510	15 - 524	AI377684, H03750, H84635, AA625639, and R22878.
HTELE10	1221	963563	1 - 495	15 - 509	
HTELE41	1222	791743	1 - 601	15 - 615	AI684943, AW117611, AI418517, and AI418516.
HTELG47	1223	757740	1 - 442	15 - 456	
HTELG57	1224	870621	1 - 441	15 - 455	
HTELG80	1225	773018	1 - 251	15 - 265	AW341441, AI651145, AI919149, AI247339, AA412289, AI218635, AI650567, AW340087, AA709187, AW118140, and AW183314.
HTELH44	1226	766462	1 - 658	15 - 672	AI298565, H92427, AW452904, AI361759, AW449414, AA004711, R75764, F04362, AC006480, AL035414, AL133404, AC004486, and AL035072.
HTELI03	1227	923071	1 - 575	15 - 589	AC005157.
HTELI51	1228	806403	1 - 654	15 - 668	AI022339, and Z99127.
HTELI89	1229	966134	1 - 376	15 - 390	AA397525, AA399055, AA758883, and AL022101.
HTELK14	1230	794339	1 - 453	15 - 467	Z99716.
HTELK50	1231	870552	1 - 227	15 - 241	AL078475.
HTELK68	1232	923055	1 - 646	15 - 660	

HTELL48	1233	783824	1 - 515	15 - 529	
HTELL51	1234	952267	1 - 635	15 - 649	
HTELL90	1235	952269	1 - 940	15 - 954	AA913156, AI221124, AA305153, and AF106564.
HTELM89	1236	786268	1 - 288	15 - 302	AI591200, AA102066, AI867662, AW088720, and D26018.
HTELO20	1237	926910	1 - 420	15 - 434	AL031597.
HTELO51	1238	931120	1 - 378	15 - 392	AI540890, AI557426, AI557082, AI541027, AI547225, and AI541056.
HTELO73	1239	761806	1 - 514	15 - 528	AL078613.
HTELO93	1240	934344	1 - 249	15 - 263	
HTELP27	1241	921621	1 - 564	15 - 578	R80089, X85707, and X85708.
HTELQ41	1242	922634	1 - 449	15 - 463	AA310475, AI536833, AA319470, AA278518, AA319408, W20004, AI611260, AA418173, AI968286, AW182252, AA315267, AA491655, AW170378, and AI904985.
HTELQ87	1243	761768	1 - 449	15 - 463	AI125340, AI125684, AI377949, AA884214, AI126470, AI218351, AI243952, AA723933, AI240603, AI143979, and AI187742.
HTELR90	1244	826531	1 - 437	15 - 451	AA652491, and AF152924.
HTELT72	1245	761598	1 - 447	15 - 461	AI827560, AI336053, AA873745, AA451732, AI436724, AA923591, AA055247, AW189536, AA747873, and Z40977.
HTELT83	1246	780619	1 - 699	15 - 713	AA746627, AA398848, AA435892, AI208905, AI024568, AA861337, AA861875, and AA910621.
HTELU01	1247	915339	1 - 367	15 - 381	AL033517.
HTELV06	1248	934302	1 - 457	15 - 471	AI799028, AW263660, AA861674, and AA993711.
HTELV10	1249	963576	1 - 256	15 - 270	
HTELV26	1250	796832	1 - 435	15 - 449	AI198878, AI190586, AI018804, AL042837, AI208256, AA725583, AI016643, AA833661, AA626323, AA993365, AI018351, AA718913, AA725636, AA992718, AI183840, AA403023, AI911045, R60037, AA398422, AW410573, AA749431, AI128961, AI077415, AI198777, AI439996, AI934676, AI199096, AA682387, H92998, AI200368, AA778651, AA045098, AW157530, AW250790, AA587915, AW188549, AI819989, AI951978, AW007464, AI951992, AI376410, AI677931, AA778720, AI364379, AA584288, AW162769, AI040155, AA150015, AI187131, AA977318, AI373112, AI000432, AI038499, AI076148, AI278114, W94564, AA513466, AA946608, AI279549, AI758476, AW103741, AA836837, AI700221, AI253749, AI913907, AA057355, AI038357, AI758826, H71311, AW004637, AW273537, AA186980, AI885648, AA824341, W70033, T35014, AI262733, AI693026, AA196549, AI868298, AI090830, T16464, AL042836, AI887548, AW025276, AI139138, and AA150080.
HTELV43	1251	870615	1 - 434	15 - 448	AC007746.
HTELV86	1252	910946	1 - 1086	15 - 1100	AI272244, AA382531, AI809639, U35371, and X99043.
HTELW29	1253	952241	1 - 768	15 - 782	AW117507, AW105238, AW105158, AA969617, AI692859, AA934716, AA383047, and

HTELW62	1254	870596	1 - 486		AI917691.
HTELX52	1255	963506	1 - 345	15 - 500	AA393684, AA813816, and AI700752.
HTELX72	1256	761599	1 - 216	15 - 359	AI220445.
HTELY64	1257	764834	1 - 437	15 - 230	
HTELZ07	1258	952268	1 - 535	15 - 451	
HTELZ89	1259	786424	1 - 451	15 - 549	
HTEMA54	1260	911666	1 - 1484	15 - 465	AI954673, AI220421, AA813119, AA382989, AI024406, AF113526, AB023063, and AF113519.
HTEMB26	1261	827055	1 - 130	15 - 144	AC004900.
HTEMB28	1262	870614	1 - 402	15 - 416	
HTEMB34	1263	870589	1 - 533	15 - 547	
HTEMB72	1264	761602	1 - 294	15 - 308	
HTEMB83	1265	775593	1 - 370	15 - 384	AA778498, AI337034, AA609166, AA625857, AI201263, AA437287, AI678062, AI961118, AI203907, AI917789, AA626247, AA927799, AI187708, AA442366, AW294301, and AL050341.
HTEMCI8	1266	924727	1 - 447	15 - 461	AI813375.
HTEMC75	1267	848193	1 - 296	15 - 310	M78994, R86687, T08961, AW402241, R46318, AA349761, AA350295, AA354235, H15340, AI909793, D31764, and AF037332.
HTEMD10	1268	963546	1 - 673	15 - 687	AA625914, AA416795, and AC005858.
HTEMD73	1269	761783	1 - 430	15 - 444	AI026681, AA609997, AA382092, AA789295, and T12649.
HTEMF08	1270	958386	1 - 494	15 - 508	
HTEMJ34	1271	786377	1 - 550	15 - 564	AI142370.
HTEMJ54	1272	963531	1 - 558	15 - 572	H59039.
HTEMK03	1273	923066	1 - 347	15 - 361	
HTEMM80	1274	888686	1 - 869	15 - 883	AA759198, and AA968427.
HTEMN08	1275	958374	1 - 232	15 - 246	
HTEMN95	1276	789113	1 - 311	15 - 325	
HTEMO14	1277	880634	1 - 407	15 - 421	
HTEMO85	1278	771434	1 - 485	15 - 499	AA804990.
HTEMP48	1279	767863	1 - 348	15 - 362	AL049761.
HTEMP49	1280	932319	1 - 774	15 - 788	AA933702, AL036538, AA928649, AA393559, AW104883, AA974777, AA587615, AA594505, AI351083, AA406036, AI004273, AI217923, AA923027, AA435495, AI128197, AA496058, AI187946, AI026847, AA865921, AA383556, AA927439, and AL117564.
HTEMR65	1281	909280	1 - 1112	15 - 1126	AW003084, AA574346, AW188065, AI657112, W37979, AW162204, W37760, AW172598,

HTEMS10	1282	963527	1 - 386	15 - 400	AI655693, AA283822, AI937864, AA454174, AI016572, AW044162, AW162368, AI420414, AI804706, and AI567345.
HTEMS48	1283	832506	1 - 341	15 - 355	AW082687, AA774543, AW195592, AW274057, AA460327, AA382893, AI126206, AI198578, AA682221, AW183102, and AA911099.
HTEMT06	1284	934338	1 - 636	15 - 650	AA045732, AA412195, T70810, T85978, H26344, AA293873, AI343622, and AC004231.
HTEMT89	1285	922999	1 - 630	15 - 644	AI016782, AI149777, AA448011, AA448155, and AI285926.
HTEMU17	1286	789623	1 - 335	15 - 349	AW003548, AA757091, AW014801, AA813302, AA437209, AP000220, and AP000084.
HTEMU54	1287	870618	1 - 436	15 - 450	W90717, and W90708.
HTEMX92	1288	913795	1 - 525	15 - 539	AP000470.
HTEMY30	1289	870662	1 - 219	15 - 233	
HTEMZ04	1290	927021	1 - 363	15 - 377	AL048534, AA403281, N78348, and AL031255.
HTENA22	1291	870601	1 - 720	15 - 734	
HTENB03	1292	923050	1 - 476	15 - 490	AL080132, AC011594, AC006238, R38805, R49132, R49132, H06801, N66174, N98697, AA043641, AA146965, AA147010, AA259116, AA259155, AA534491, AA570283, AA687335, AA766643, AA910635, AA948152, AA401719, AA609258, AA626320, AA644562, AA680291, AA757030, AA758747, AA888971, AI023819, AI032507, AI088947, AI274536, AI345946, AI431770, AI192387, AI214901, and AI217881.
HTENC22	1293	775544	1 - 560	15 - 574	
HTENF08	1294	958378	1 - 743	15 - 757	AW195712, D44825, AI124542, and AB032984.
HTENF95	1295	795316	1 - 333	15 - 347	
HTENG66	1296	840151	1 - 295	15 - 309	AI473748, AI798247, AA279454, AL138273, and AW149414.
HTENG93	1297	967432	1 - 91	15 - 105	
HTENH86	1298	784798	1 - 601	15 - 615	AA393073, AI139819, AA860114, AA412161, and AA868102.
HTENI58	1299	917213	1 - 636	15 - 650	AI970129, AW237169, AI621267, AI653036, AI797400, AI797725, AW182923, AI961057, AI970364, AI191623, AL036577, AW188292, AI341330, AI655836, AA918201, AI202983, AI825213, AI824962, AI990770, AA890172, AI982569, AI918790, AI205504, AI611043, AI969360, AW293674, AI203082, AI828842, AI634070, AI962396, AA757981, AI917843, AI867911, AI824830, AA903616, AI968361, AA781952, AI036578, and AA629230.
HTENI28	1300	968135	1 - 1014	15 - 1028	AI240133, and AF032967.
HTENI76	1301	767838	1 - 431	15 - 445	AF012383, AI307797, AW270088, and U86074.
HTENK06	1302	835851	1 - 552	15 - 566	AB020719.
HTENK69	1303	844557	1 - 899	15 - 913	
HTENO12	1304	917032	1 - 1454	15 - 1468	AL042436, AL042437, AI674705, AA400083, AW241753, AA401372, AI218464, AA953011, AA972296, AA812520, AI125824, AA437087, AI028669, and AI024321.

HTEN050	1305	969213	1 - 635	15 - 649	AA905347, AA371108, T20204, Z43158, and AA151400.
HTENP54	1306	787535	1 - 494	15 - 508	AA496169, and AC009411.
HTENP80	1307	775387	1 - 482	15 - 496	AL035453.
HTENQ05	1308	928244	1 - 641	15 - 655	AA393064.
HTENR10	1309	963530	1 - 575	15 - 589	
HTENR74	1310	764828	1 - 444	15 - 458	AI823791, and AF069682.
HTENR93	1311	920834	1 - 875	15 - 889	AI381463, AA634395, AA406053, AA405219, AA383176, and AF121781.
HTENS22	1312	785996	1 - 532	15 - 546	H83100, AL044519, and AL137391.
HTENS43	1313	784936	1 - 1079	15 - 1093	AI971582, H58143, AI498833, AI393537, and AA973074.
HTENS91	1314	870515	1 - 720	15 - 734	AA225153, AA629286, AA225136, AI272649, AA909816, AA070899, AI866377, AA229443, R67086, AA084212, AW243884, H59093, AA158549, AC002086, AL133304, AC000004, AL049830, AC006050, AC007270, AL031846, AC006125, D43727, AL031670, AC002470, AL050318, AC007114, AF001549, AP000329, AL135959, AC003070, AL034420, AL031286, AC007226, AL049694, AC004143, AL022476, Z93244, Z68284, AP000359, AC005015, AL034429, AC000394, AC006120, AC003029, AL031589, AC004782, and AL035072.
HTENV57	1315	944416	1 - 605	15 - 619	
HTENW53	1316	907717	1 - 806	15 - 820	AA429691, AA429515, AC007114, Z61140, and AC004156.
HTENX77	1317	771409	1 - 521	15 - 535	AA781188, AA460513, AA860910, AA781845, AI027285, AI208471, AA889700, N73782, H08088, R38703, F03385, AI830535, AI474644, R41444, AA459870, AI023552, and AA421081.
HTENV21	1318	870587	1 - 705	15 - 719	AI743533, AI424822, AW082413, and AI915340.
HTENY35	1319	884043	1 - 1011	15 - 1025	AI223811, X85630, T36006, AA382232, Z21393, AA383107, N78092, T36070, T36050, Z21341, Z21392, AA459806, Z21315, AF012377, Z21111, AI827647, AW340665, AA280976, Z21340, T85719, AL043525, AL043526, R82847, AC006208, and AL137671.
HTENZ16	1320	917185	1 - 962	15 - 976	AI018671, AI807205, AI468026, AI797263, AI025828, AW194247, AI889876, AA843455, AI884356, AI198561, AI032059, AI126485, AI889886, AI239452, AA992969, AA780875, AW303976, AI216470, AA683361, AI569512, AI472962, AI885458, AW055338, AW242149, AI911290, AI222107, AI538002, AA912612, AW183126, H79395, AA884115, AI149911, AW189703, AI220396, AI203939, AA936147, AI560168, AI219573, AW243836, AA906293, AI252658, N26330, N26296, AI886564, AW085495, AA927058, and AL133596.
HTENZ33	1321	870591	1 - 616	15 - 630	AA383398.
HTENZ72	1322	773024	1 - 564	15 - 578	AI632084, AI221893, AA383392, AA759214, AW137663, AI269516, and AA923222.
HTEOA90	1323	787516	1 - 489	15 - 503	AA383437.
HTEOD34	1324	812307	1 - 552	15 - 566	AI990671, and AI990110.
HTEOE61	1325	918635	1 - 548	15 - 562	

HTEOF31	1326	793202	1 - 619	15 - 633	AL031283.
HTEOF80	1327	847224	1 - 506	15 - 520	AF186084, and AL117610.
HTEOF85	1328	768583	1 - 494	15 - 508	AI917508, AI810095, and AA973064.
HTEOF91	1329	918571	1 - 237	15 - 251	
HTEOI36	1330	870575	1 - 516	15 - 530	AA298760, AA298759, AA298601, and AL133073.
HTEOI53	1331	810333	1 - 422	15 - 436	AW206247, AI400618, AI671128, AW237084, AI811276, AI337166, AI341186, AI360596, AW235137, AI183637, AI654814, AI654771, AI969744, AI954759, AA417208, AI969746, AW087480, AA417104, AW182372, AA723770, AW241414, AW003345, AW241474, AW183339, AA432142, and AA757062.
HTEOK02	1332	918590	1 - 395	15 - 409	
HTEON29	1333	815852	1 - 978	15 - 992	AW004028, AI968030, AW237673, AA432290, AW138422, AA112090, AA428635, AI143780, AI143791, and AA861634.
HTEON67	1334	954114	1 - 335	15 - 349	AC004533.
HTEOU45	1335	915138	1 - 639	15 - 653	
HTEOV90	1336	870532	1 - 425	15 - 439	AW204420, AW058611, AI767863, AI433866, AI671711, AI802010, AI935766, AA280379, AI808931, AA523871, AI193461, AA827208, AA418269, AI302010, AA280200, AA251664, AI637584, AI932794, AI564719, AI677796, AI538716, AI633125, AI862139, AI433157, AI702073, AI476046, AW050522, AI924971, AW151786, AW198090, AI569583, AI591420, AI590227, AI619502, AW102785, AI826225, AI648663, AI863240, AI886753, AW075381, AI480118, AI270183, AI097248, AI567351, AW152182, AI434468, AW104724, AI863321, AI612759, AI679916, AI271796, AI922365, AI890833, AI926790, AI802542, AI799199, AI636719, AI241819, AI280637, AI696612, AI828731, AI873644, AA833760, AI915291, AI445992, AI874261, AI804983, AI923357, AI670009, AI560099, AI613017, AI036187, AI572787, AI570807, AW026882, AI536638, AI620003, AI624548, AI537244, AA449768, AI433023, AI934026, AW104827, AI537303, AI274508, AI273142, AI955906, AL041772, AI811785, AI796743, AI446248, AA857306, AI863382, AI554427, AI445025, AI274013, AI520702, AI446003, AI889376, AW051258, AW150453, AI699865, AI925156, AW151136, AI923370, AW148320, AI619716, AI539808, AI869367, AI689248, AW075413, AI619607, AI499285, AW029611, AI698391, AI249962, AI680498, AI567814, AI889189, AI554821, AI539153, AI554218, AI784252, AW170635, AI608936, AI569945, AI635464, AI432040, AI537273, AI817552, AI564723, AI612852, AI681985, AI432969, AI828367, AI559296, AI702433, AW075667, AI432030, AI366900, AW148408, AI436644, AI633308, AW169527, AW090550, AI569328, AI627909, AI800411, AI612920, AI919534, AI921176, AI280661, AI499381, AI469112, AI580984, AI934259, AI539687, AI567128, AW193530, AW073270, AI648502, AI783861, AI610690, AI889306, AW169653, AI648684, AW081036, AI491775, AI801523, AW054964, AI469532, AI702068, AW148363, AI819976, AW080992, AW152469,

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HTEOW02	1337	918475	1 - 596		15 - 610	-
HTEOW39	1338	870566	1 - 488		15 - 502	Z98304.
HTEOW85	1339	969682	1 - 649		15 - 663	AI684621.
HTEPA08	1340	958391	1 - 1054		15 - 1068	AI041556, AL042783, AA834968, AA789271, A1032390, AA400082, AA757197, AW206997, AA416988, AW235392, A1028342, A1024253, A1015964, AL040413, and AA411964.
HTEPA27	1341	872923	1 - 589		15 - 603	AI765491, AI469067, AI870585, AI870612, AI652881, AA055971, AI763357, AA056000, AA358708, AA889873, AI701794, N56631, AL042137, AI825129, AW297101, and AB018353.
HTEPB66	1342	772949	1 - 610		15 - 624	AW449288, AI147992, AI142275, AI654490, AI002885, AI743450, and AW103158.
HTEPB84	1343	782248	1 - 580		15 - 594	
HTEPC76	1344	767824	1 - 526		15 - 540	AI688792, AA504908, AL138425, AA908950, AI208672, and AF081466.
HTEPC87	1345	883021	1 - 514		15 - 528	
HTEPD06	1346	933299	1 - 341		15 - 355	N47565, N47576, C14331, D80227, D80269, D80378, C14429, D51799, C14389, AW118681, D80391, D59787, D59467, D80196, D80038, D59927, D50995, D58283, D59859, D80022, D80166, D80195, D51423, D59619, D80210, D80164, D59275, D80240, D80253, D80043, D59502, D81030, D81026, D51022, D80212, AA305578, D80188, D59610, D80219, AA514186, AA514188, C15076, D57483, D80024, D80366, AA305409, D50979, D59889, D80193, D80045, C14407, D80133, AW360811, D80241, D80248, D80522, D51060, AW177440, C14014, D80251, AW178893, AW375405, T03269, AW179328, C75259, AW366296, AW377671, AW360844, AW375406, AW360817, AW378534, AW179332, AW377672, AW179023, AW178905, D80268, AW378532, D80132, C05695, AW352171, AW177501, AW177511, D80302, D80134, D80439, AW377676, AW352170, AW177731, AI557751, AW178907, AW178762, D58253, AW179019, AW179024, AI535686, D80247, D51250, AW369651, AW177505, AW178906, AW352174, AW179020, AW178775, AW360841, AW178909, D59373, AW177456, AW179329, F13647, AW178980, AW177733, AW378528, AW178908, AW178754, D52291, C14227, AW179018, AW352158, AW352117, AW176467, T11417, AW179004, AW367967, AW179012, AW178914, AW378525, D51103, D80168, AA926689, AA809122, AI910186, D80157, C14344, AW177728, C06015, AW179009, D51759, D58246, D81111, AW178774, AW178911, AW378543, AW177722, AW352163, C14298, D80064, AI905856, D59503, AW178983, AW178781, T48593, D58101, AW360834, Z21582, AW177723, AW378540, AW352120, D59627, D59653, D80258, AI535850, AW378533, D45260, D51097, C14975, Z33452, AW367950, D80014, AA285331, AW177508, H67854, C03092, H67866, AI525920, AI525923, D51213, AW177497, D80228, AW178986, C14973, D50981, D45273, N66429, T03116, AI525917, D59317, AW177734, D51221, D59474, D60010.

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HTEPE28	1347	932576	1 - 694	15 - 708	AA205046, AA383391, A1184616, AA223825, A1825541, A1469846, and D42084.
HTEPG15	1348	812303	1 - 533	15 - 547	A1937640, T18881, R24582, AA412546, A1083751, AF079564, AF079565, AF106658, AF106659, AF202454, AF202453, and Z63351.
HTEPH01	1349	915301	1 - 618	15 - 632	AA399486, T69681, and AC007537.
HTEPJ09	1350	956200	1 - 1202	15 - 1216	AA394192.
HTEPJ19	1351	918599	1 - 453	15 - 467	T18597, D59751, A1557262, A1525556, Z33559, A1540903, Z32887, D50992, A1557533, A1536138, A1535660, A1541205, D59436, A1526078, A1535639, A1541321, A1541075, C14228, A1557864, A1557238, AA058620, A1557808, A1525500, A1557082, H65400, A1525653, A1535828, A1557809, A1541356, A1557602, A1541365, A1557731, A1525302, A1525316, A1535813, A1546829, A1525757, A1540974, A1557312, A1557317, A1541154, R29657, A1536150, A1541034, A1557852, A1525856, A1535994, A1541353, A1541027, A1541048, A1557258, A1557543, A1525666, A1557041, A1557426, A1536070, A1557039, A1557810, A1525656, A1547177, D30843, A1557408, AR050070, A62298, A82595, A82593, U94592, Z30183, A62300, AF006072, and AR025466.
HTEPJ79	1352	774212	1 - 359	15 - 373	
HTEPK40	1353	939675	1 - 619	15 - 633	A1075905, A1796754, AW137492, A1652522, AA393248, A1217933, AA459841, A1150346, AA293815, A1694956, AA435622, AA393292, AA719008, AA629029, A1024099, AA861041, AA398164, AA402463, AA399502, R24468, R66361, AA688372, AF081250, and AF081249.
HTEPM33	1354	870561	1 - 816	15 - 830	AA824347, AA889787, A1425084, AA868962, A1190895, A1132776, and AF083394.
HTEPM52	1355	806471	1 - 444	15 - 458	
HTEPN07	1356	952243	1 - 307	15 - 321	Z99716.
HTEPP23	1357	836572	1 - 327	15 - 341	A1150152, A1216505, AW103179, and AC006017.
HTEPP29	1358	917207	1 - 458	15 - 472	
HTEPP30	1359	947107	1 - 732	15 - 746	AF191546.
HTEPP32	1360	785803	1 - 963	15 - 977	AA402763.
HTEPP92	1361	790869	1 - 596	15 - 610	

HTEPR90	1362	787499	1 - 155	15 - 169	
HTEPT25	1363	870509	1 - 393	15 - 407	
HTEPT75	1364	870637	1 - 630	15 - 644	AI283483, AI873282, and AI827738.
HTEPU01	1365	915134	1 - 704	15 - 718	
HTEPV02	1366	917406	1 - 489	15 - 503	
HTEPX32	1367	870698	1 - 1349	15 - 1363	AI217947, AW237109, AI918745, AI968403, AA934788, and X84693.
HTEPZ10	1368	963433	1 - 529	15 - 543	AI217204, AW183426, and AA759358.
HTEPZ18	1369	888470	1 - 560	15 - 574	AA397836, AI139919, AW162347, AI223276, AI879324, AI200822, AI150592, AI028601, AI200868, AI879701, AI138943, AI652314, AI377443, AA868111, AW160551, and AF177398.
HTEQB03	1370	922941	1 - 396	15 - 410	AI624244, AL120897, AL121756, AC007099, Z99496, AC004584, AC002418, AP000248, AC004386, AL050305, AC002483, AL022315, AL034452, AC004638, AC005899, AC000353, AC004623, Z84476, and U91323.
HTEQD40	1371	915198	1 - 543	15 - 557	AI623182, AA776747, AW082325, AW273819, AI539350, AI810085, AI125567, AI221672, AI200770, AI204194, AW263528, AI240146, AA437189, AA758317, AI192035, AA709217, AA992316, AA758401, AA961979, AI217262, and Z66485.
HTEQD69	1372	918579	1 - 607	15 - 621	
HTEQE87	1373	958354	1 - 729	15 - 743	AA913948, AI633873, AI638029, AI900760, AI806847, AW003193, AI190550, AA431560, AI187284, AI915840, AI286045, AI243468, AA719044, AA448281, AI219847, AW135537, AA861812, AA861291, AI969788, AA812901, AI187727, AI286137, and AI942348.
HTEQG56	1374	881004	1 - 577	15 - 591	
HTEQL54	1375	853971	1 - 603	15 - 617	AW299627, AA917835, AA758010, AI989828, AW103119, and AW241908.
HTEQJ14	1376	870525	1 - 496	15 - 510	
HTEQJ42	1377	806495	1 - 496	15 - 510	AA383039.
HTEQO81	1378	806504	1 - 375	15 - 389	AA382997, and AA397859.
HTEQP45	1379	966141	1 - 127	15 - 141	
HTEQQ82	1380	932301	1 - 590	15 - 604	AA609033, AA293870, AA382673, AW263657, and U51244.
HTEQR15	1381	939641	1 - 756	15 - 770	AI979286, AA382595, and AF133424.
HTEQR94	1382	966486	1 - 556	15 - 570	AI990882, AA447560, AI201149, AI341615, AW002367, AI651854, AA437021, AI149956, AI140621, AW292211, AA620811, AW196416, AA757082, AA993629, AA932499, N92273, AA448543, AI458277, AA398159, AW004057, AI918824, AI635506, AA401699, AA994466, and AI016246.
HTEQT63	1383	924799	1 - 1298	15 - 1312	AI142296, AA417385, and AI148005.
HTLAB19	1384	530577	1 - 347	15 - 361	
HTLAB44	1385	530579	1 - 253	15 - 267	AC006549, AC000097, and AC006547.
HTLAB73	1386	575019	1 - 320	15 - 334	AC000078.

HTLAC81	1387	679414	1 - 192	15 - 206	AF038406.
HTLAC87	1388	546469	1 - 226	15 - 240	
HTLAD21	1389	761758	1 - 490	15 - 504	AI217166, AI184534, AI150079, AI142754, AI697160, AI811701, AI214713, and AW188915.
HTLAD38	1390	421550	1 - 517	15 - 531	
HTLAF84	1391	836390	1 - 558	15 - 572	AA418228, AF045454, D63648, and E13935.
HTLAV67	1392	530742	1 - 208	15 - 222	AC005258.
HTLBD12	1393	506739	1 - 319	15 - 333	AL121757.
HTLBE55	1394	967408	1 - 293	15 - 307	AL036680, AA421020, AW151136, R66759, AL037558, AL045421, AA830821, AW149876, AI571529, AI355008, AI567582, AW089006, AI471361, AW023338, AW020095, AL041150; AW167924, AI829990, AI345224, AI079736, AL046463, AI311892, AW162194, AI697324, T99953, AW243637, AI921167, AA291456, AI539771, AI873638, AI473451, AI805688, AI888621, AI28574, AW022682, AW239367, AI540606, AI689420, AI336662, AL038575, AA464646, AW020693, AI890887, AI590423, AI570966, AI307507, AI916419, AI611728, AI470293, AI929108, AI538850, AI610667, AA572758, AI648567, AW088899, AI805638, AI366549, AI799195, AI866082, AI636719, AI539153, AI620093, AI866608, AI636619, AL120853, AI340603, AI537677, AI611743, AW083804, AI349598, AI582912, AW172723, AI539800, AI696626, AI349256, AW075207, AI589993, AI866573, AI312152, AI365256, AA579232, AA807088, AI343037, AI345735, AW085786, AW265004, AW075084, AI310925, AL038564, AI472536, AI312399, AI677797, AW082600, AI349937, AI567944, AI345688, AI334884, AI307543, AI494201, N71199, AI345251, AW071412, AI307210, AI307708, N29277, AI312325, AW071395, AL036631, AI538885, AI249946, AI244380, AI340659, AI589267, AW071377, AW129230, AI802240, AW161579, AI313320, AI955906, AI340644, AI805769, AI434242, AI313352, AI335363, AI307503, AI539707, AI334930, AI309443, AI623682, AL039086, AI307736, AW161402, AI307520, AI623736, AI446124, AW084097, AI349266, AI349787, AI334452, AI340664, AI310592, AI344938, AI312146, AI866786, AI309431, AI312339, AI340537, AW301300, AI345739, AW161202, AI345674, AI345258, AI538764, AI312143, AI307459, AI349637, AA635382, AI273179, N74355, AI312428, AI499974, AI310927, AL110306, AI311604, AI307578, AA420722, AW162189, AI436429, AI349955, AW189933, AW075093, AI312432, AL120300, AA580663, AI349269, AI312357, AI590943, AI358701, AW021588, AI310945, AL040241, AW088903, AW151714, AL036638, AI636581, AI583445, AW059713, AI648408, AI312237, AI922901, AI446373, AW263716, AI251830, AI343059, AI917963, AI573026, AI349933, AW193467, AW268261, AW082623, AI249877, AL047422, AL133741, AA493923, AI345253, AW409775, AL119836, AI345677, AW167918, AA494167, AW191003, AI633402, AL119791, AW071362, AW021373, AI345608, N98606, AW191844, AI336513, AI357599, AI433968, AI499581, AA848053, AI554821, AW264719, AL046618, AI348895, AI345347, AW269097, AI866465, AI310575, AI589428,

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HTLBE82	1395	780116	1 - 467	15 - 481	H03896, AA788921, AA985315, and AL133595.
HTLBF14	1396	971661	1 - 728	15 - 742	
HTLBG83	1397	527942	1 - 187	15 - 201	AA132777, AA809070, and AI799864.
HTLCA95	1398	911655	1 - 1148	15 - 1162	AI028227, AI798166, AI968058, and AI962770.
HTLCG77	1399	772644	1 - 98	15 - 112	

HTLCX76	1400	767667	1 - 265	15 - 279	AL045710, and AL096749.
HTLCY27	1401	682208	1 - 288	15 - 302	W92263, AA736600, AI962876, AI539379, AI672273, AL045130, AI656897, AW001387, and AI806122.
HTLCY54	1402	908832	1 - 1050	15 - 1064	AA453366, AI188219, AI638044, AA983750, AI219830, AA453265, and AA912820.
HTLCZ48	1403	572959	1 - 399	15 - 413	
HTLCZ96	1404	815897	1 - 459	15 - 473	AW139921, AA725842, AI971598, AI651885, AA453466, AL110422, AI027229, AI026797, AA778573, AI279962, AI073425, AI208767, H55405, and AL118498.
HTLDA58	1405	828115	1 - 259	15 - 273	AA948338.
HTLDE53	1406	780842	1 - 610	15 - 624	AA400498, AA400590, AA861265, AA398875, AI149809, AI198885, AA435582, AA460749, AA460151, AA889548, AI015434, and AA815269.
HTLDE64	1407	908613	1 - 838	15 - 852	
HTLDE95	1408	616724	1 - 285	15 - 299	AA566051, AA552211, AA393552, AA418209, H05646, H06920, R34733, AA293017, Z42496, AI743990, and AA280537.
HTLDF33	1409	909254	1 - 616	15 - 630	AI376558, AI208582, AI149687, AI028197, AA629337, AI027966, AI202003, AA694500, AI701718, AW207552, AI336775, AI560530, AI215526, AW207059, and AI015601.
HTLDG55	1410	911645	1 - 196	15 - 210	
HTLDH65	1411	839795	1 - 901	15 - 915	N47989, AI675771, AI024189, AI651589, AI621081, AW003588, AW293606, AI026721, AA954294, N51195, and AA983886.
HTLDI90	1412	835850	1 - 458	15 - 472	AB020719.
HTLDO94	1413	915223	1 - 542	15 - 556	AA860341, AA889689, AA730148, AA478113, AI024743, AA730132, AA082366, and AA758028.
HTLDP77	1414	920546	1 - 638	15 - 652	AC002128.
HTLDQ25	1415	870057	1 - 1220	15 - 1234	AA399278, AA889597, AA758803, AW117336, AA398195, AA729781, AA889586, and AA922590.
HTLDS55	1416	891322	1 - 1302	15 - 1316	AI890919, AI018797, AA913452, AI797580, AI809012, AI187382, AA448485, AI554914, AW137847, AI393577, AA382830, AA432050, AA609003, and AC020663.
HTLDT05	1417	909752	1 - 473	15 - 487	R59447, R17647, T62170, and AI439348.
HTLDT81	1418	952265	1 - 480	15 - 494	AA398001, AA399683, AW177623, AA809773, and AL137531.
HTLDU05	1419	911649	1 - 589	15 - 603	AA437044, AF113527, AB023062, and AF113520.
HTLDV31	1420	867748	1 - 297	15 - 311	
HTLDX88	1421	791684	1 - 686	15 - 700	
HTLDY85	1422	573746	1 - 481	15 - 495	
HTLDZ14	1423	573401	1 - 334	15 - 348	
HTLEB14	1424	573464	1 - 402	15 - 416	
HTLED72	1425	906989	1 - 273	15 - 287	

HTLEF94	1426	870258	1 - 309	15 - 323	
HTLEG65	1427	870154	1 - 1167	15 - 1181	
HTLEG91	1428	870257	1 - 99	15 - 113	Z94160.
HTLEH30	1429	934287	1 - 542	15 - 556	
HTLEI47	1430	573460	1 - 463	15 - 477	
HTLEI11	1431	973302	1 - 956	15 - 970	M62294.
HTLEJ93	1432	960314	1 - 294	15 - 308	AL044506.
HTLEK64	1433	506747	1 - 318	15 - 332	AA442457, AA601393, AC005625, and AC005789.
HTLEL01	1434	917022	1 - 515	15 - 529	AC003976, AC005702, AC005562, and AL117394.
HTLEL03	1435	575080	1 - 93	15 - 107	AF042793, AB011130, AF042792, AF040709, and Z84492.
HTLEL07	1436	953712	1 - 581	15 - 595	
HTLEL31	1437	669950	1 - 131	15 - 145	AA250913, W56681, R24109, H01291, AA161334, AW160808, and AF053356.
HTLEM46	1438	719160	1 - 443	15 - 457	AI760165, AI341569, AW241888, AW135684, AI624778, AA883817, AI494564, AA722107, AA521079, and AA405142.
HTLEO50	1439	506649	1 - 335	15 - 349	Z68869.
HTLEP16	1440	574942	1 - 567	15 - 581	AA305510, AA099550, AI917501, AI631488, AI142135, AW391262, AA305581, N39659, AI829757, and AF151810.
HTLEQ07	1441	953706	1 - 592	15 - 606	AL133071.
HTLES43	1442	573403	1 - 203	15 - 217	
HTLES54	1443	574884	1 - 312	15 - 326	AI207997, and AW172597.
HTLET56	1444	911654	1 - 1096	15 - 1110	AI968198, AI655275, AA397903, AL044119, AW003563, AL044118, and Z74696.
HTLET78	1445	836820	1 - 812	15 - 826	AL041695, AA454137, TI9069, D31497, and AL133566.
HTLET93	1446	573454	1 - 99	15 - 113	
HTLEV33	1447	527956	1 - 261	15 - 275	AI808336, AW013835, AI624717, and AI650408.
HTLEV95	1448	883332	1 - 574	15 - 588	AA776758, AI808140, AA884694, AA909615, AA904970, AA909196, AW294544, AA723919, and AI525608.
HTLEW12	1449	870255	1 - 334	15 - 348	R02814.
HTLEW21	1450	573458	1 - 311	15 - 325	AL122083.
HTLEY11	1451	967309	1 - 336	15 - 350	
HTLEY91	1452	775310	1 - 212	15 - 226	AC005343.
HTLEZ14	1453	791662	1 - 322	15 - 336	AC000097, AC006547, AP000344, and AC006549.
HTLEZ15	1454	934288	1 - 368	15 - 382	D51002, AI541205, AI541321, AI557082, AI535660, AI557238, AI557258, AI557602, AI525500, Z33559, T18597, AI557533, AI557731, AI525556, AI557262, H65400, AI557234, AI525757, C14322, D50992, AI525856, AI557241, AI541027, AI525852, AI535639, AA058620, AI540903, AI541365, AI557084, AI541048, N71206, AI557312, AI526078, AI557474,

HTLEZ32	1455	870261	1 - 512	15 - 526	AI525302, Z33585, AI541075, AI541034, AI541346, AI541353, AI541154, AI557039, AI557041, AI557222, AI557317, AI525656, AI546829, AI536070, AI535813, AI525666, AI541056, AI535994, AF025310, Z30183, U45328, AR050070, U94592, A82595, A82593, A63903, A62298, and A62300.
HTLFA74	1456	934172	1 - 695	15 - 709	AC003899.
HTLFC20	1457	917128	1 - 1029	15 - 1043	AA398001, AA399683, AW177623, AA809773, and AL137531.
HTLFE01	1458	917033	1 - 591	15 - 605	AA356490, R05624, AA262044, and AL138430.
HTLFE05	1459	954984	1 - 1305	15 - 1319	AW275845, AI830267, AI572906, AI439086, AA766499, AA723111, AA836614, AA453028, AA747738, AA483838, AA077798, AA077483, AW302599, AA215573, AA077013, AA009576, AA078283, AA323484, AA077510, AJ007798, and AC005071.
HTLFE20	1460	934278	1 - 463	15 - 477	AC006237.
HTLFI28	1461	775392	1 - 423	15 - 437	AC003963.
HTLFI39	1462	953730	1 - 616	15 - 630	AF053356, and AF174604.
HTLFI83	1463	781303	1 - 501	15 - 515	AL117491, AB007913, AL137693, and AL110281.
HTLFI39	1464	573462	1 - 329	15 - 343	AI001797, and AI910520.
HTLGD25	1465	870136	1 - 1477	15 - 1491	AA608970, and AA758832.
HTLGD69	1466	835493	1 - 1010	15 - 1024	AA403179, AA398239, AW339857, and AA952990.
HTLGG36	1467	789656	1 - 561	15 - 575	AW269804, AA781852, AW104592, AI239999, AI698249, and AC005821.
HTLGK55	1468	868309	1 - 470	15 - 484	AW393087, R16949, R75708, H44330, AA186786, AA259086, R55419, AA329264, AA335735, AA329538, AA393356, AA354448, W93021, AA136776, T35806, T10451, R46300, R54656, R10335, AA076725, W51754, AL137358, and AL050110.
HTLGM02	1469	964878	1 - 752	15 - 766	C02944, C03248, AI807681, AA095819, AI797565, AI333238, AI863457, H53759, AW138808, AW451889, AW138004, AW207397, AW184023, and AC005216.
HTLGM07	1470	952254	1 - 1194	15 - 1208	AI693474, AL042395, AL041671, AW168041, AI738586, AA504349, AI125391, AI990015, AA838043, AI149664, AL041569, AI864457, AA579771, AW273185, AW294188, AW197733, AI805280, AA383594, AI699335, AI138789, AI653680, AI738485, AA383400, AI475427, AA976749, AI203057, AA883961, AI968077, AF096834, AF073954, AF073955, AC003688, and L07578.
HTLGT62	1471	918606	1 - 533	15 - 547	AL040693.
HTLGW17	1472	958208	1 - 794	15 - 808	
HTLGX90	1473	870528	1 - 1358	15 - 1372	AA399144, AI982647, AA394141, AA234366, AA405404, AA034080, AA644012, AA234434, T86343, AI344623, R02436, T86344, AA707052, R02333, and Z98257.
HTLHC14	1474	908428	1 - 752	15 - 766	AI738485, AI738586, AF096834, AC003688, AF073955, and AF073954.
HTLHE72	1475	963471	1 - 494	15 - 508	AL078621, Z63130, and Z63232.

HTLHL82	1476	958334	1 - 1159	15 - 1173	AA459835, AI286187, AA742548, AI187289, AI392611, AA922025, AI138515, AA884337, and AI936608.
HTLHO94	1477	968685	1 - 460	15 - 474	AI632413, AA026276, AA382241, AA936327, AI026815, AA382375, AA026275, AA860376, and AC006445.
HTLHP32	1478	933335	1 - 615	15 - 629	AW405738, AA116025, AA102802, AA211814, D63260, AA306027, H97316, T78952, X93817, AW136521, AI659011, AW382734, AW374638, AL022316, Z93241, and AF151854.
HTLHP52	1479	926980	1 - 569	15 - 583	
HTLHP80	1480	870156	1 - 590	15 - 604	AA483387, AA065093, AA126035, AA126051, AI871722, AA164944, AA199708, AL044904, Z69651, AP000337, and AC002425.
HTLHT15	1481	946586	1 - 560	15 - 574	T85616.
HTLHT24	1482	870254	1 - 1191	15 - 1205	AA402128.
HTLHU04	1483	926950	1 - 998	15 - 1012	AI869974, AA405686, AI199718, AI969027, AW086198, AL045468, AW082694, AA399273, AW136449, AI933024, AA412383, AA300675, AA405951, AA412243, AL045467, AI150480, AA889135, and AI217882.
HTLHV67	1484	936139	1 - 735	15 - 749	H44302, R50303, AA341701, AA179217, T60490, AA478857, R47809, AA234882, AA302994, AI797287, F12041, T66192, H81762, AW403784, AA171826, AI417037, AI906347, AI436806, AA298718, AI906396, and AF005038.
HTLHZ08	1485	958321	1 - 663	15 - 677	
HTLHZ10	1486	963475	1 - 677	15 - 691	AC005971.
HTLIA92	1487	784817	1 - 723	15 - 737	AA382329, and T27180.
HTLID36	1488	945891	1 - 521	15 - 535	AC003662.
HTLIK11	1489	966043	1 - 471	15 - 485	
HTLIP19	1490	958351	1 - 941	15 - 955	AA431834, AA412657, AA399262, AI970493, AI026627, AA412489, AA431430, AA383405, AL042749, and AI696044.
HTLIQ09	1491	931046	1 - 630	15 - 644	
HTLIR30	1492	870115	1 - 709	15 - 723	
HTLIU76	1493	946300	1 - 829	15 - 843	AA393092, AA453482, AF012388, and AF002992.
HTLIV78	1494	947234	1 - 685	15 - 699	AA846864, AI125243, AA446154, AW003474, AI200764, AW137061, AA92083, AI139618, AA429664, AA991813, AA923010, AI150169, AI825677, AI917106, AA429514, AW029457, AW264822, AI800160, AW085654, AI445992, AI660211, AA761545, AW084368, AI633009, AA113768, AI863191, AL048875, AW117746, AI874189, AI583982, AI634707, AW149869, AI537989, AI140134, AI680138, AL035460, and AF185576.
HTLIY52	1495	942161	1 - 1354	15 - 1368	AI827749, AI819667, AI580407, AI025487, AI223109, AI150036, AW087713, AI024234, T18864, AI479322, AA883975, AW341589, AA860213, AI831802, AA913074, AA608857, AI050685, AA860223, AA948538, and AI075930.

HTLJA23	1496	953729	1 - 943	15 - 957	AF053356, AF174604, and AF083655.
HTLJA24	1497	934279	1 - 560	15 - 574	AC006237.
HTLJC71	1498	922923	1 - 1738	15 - 1752	AL039539, AL045443, AI336919, AA406128, AA405229, AL042307, AA431504, AA311249, AW086440, AA813520, AI240644, AA897733, AW268487, AA782009, AW172455, AI301209, AI014598, AA969918, AL041043, AA431178, AL039540, AA973051, AI221826, AL133030, AC009516, AP000552, AP000556, AP000557, and AL117509.
HTLJD35	1499	967336	1 - 518	15 - 532	AL041339, AF025310, and AF200923.
HTLJD88	1500	953714	1 - 865	15 - 879	AA889705, AA224167, AW263624, AI627392, AA907369, AA224175, H41231, AI392654, AI223199, AI208705, AI825010, AL033527, and Z66397.
HTLJJ75	1501	924755	1 - 1137	15 - 1151	W02882, AI017323, AW118900, AA912672, AI208003, AA909041, AI765407, AI765419, AA609441, Z33510, AI016233, AI657083, AI339208, AI991437, AA781685, AA860425, AA382780, Z21333, AA357733, Z21332, AA256011, N74515, AL031587, and AF006501.
HTLJL23	1502	922994	1 - 1787	15 - 1801	AA301270, AA301379, and AA301366.
HTTAD55	1503	835652	1 - 246	15 - 260	AA301335, AA301157, W27731, AA525760, AA449997, AW088581, F07155, AW337237, AI536857, AI524371, AA737106, AA056569, AA491298, AA953587, AI857836, AA515753, AW080777, AA491681, AI766408, AI278972, T39494, R97104, N55508, AI376747, AW081296, AI311647, AI923333, AI207465, F08230, AA531412, AI183976, AA601355, AA953228, AA165505, N73610, AA598927, N72717, AI620992, H72530, AA970967, AI809745, AI923052, AI674840, AI341654, AA648942, T07769, H84675, AA602727, AI950671, H70076, AI270675, R49657, AI908093, AL021939, AL022238, AC004526, AC007546, AL121748, Z98051, AC005368, Z83846, AC004000, L78810, AL021368, AC004447, AL031667, AL049552, AF059650, AL008707, AC004833, AL049745, AC006344, AC006387, AL034419, Z98884, AC004805, AC004996, AL022326, AL035046, AP000080, M31061, M33764, X16277, M81740, U73636, AL031668, AL121658, AC006271, AL133382, AC009286, AC003041, AC007461, AL031587, Z98742, AC005953, AP000557, D87009, AL031311, AC002312, AP000023, AC002350, AL137100, AL022721, AC007051, U07562, AC010209, AC006160, AC007919, AL118510, AC007559, M97911, AC007564, AC004799, AC005067, AC002369, AC005227, AC008122, AL096763, Z95116, AC004947, AC004841, AC003049, AC004655, AC004838, Z85986, AP001053, AC005962, AC008015, AL035086, AC004098, AC005384, AC006115, AC009405, AC006239, AC003684, AP000171, AP000056, AC004477, AC007934, AC003669, AL035078, Z75888, AL049589, AP000967, AC004757, AF106564, U47924, AL078472, AC003038, AC004686, AC004966, AL050318, AC005803, AC005726, AC004228, AC006449, AC004492, AC003091, AC005179, AC004905, AC006552, AF200465, AL049835, AL080242, AL035682, AC005230, AC005484, Z92547, AL031283, AL049759, AL009181, AC004938, AC004008, AF030453, Z98946, AC005088, AC007014,
HTTAE49	1504	723331	1 - 269	15 - 283	

HTTAH87	1505	509574	1 - 304	15 - 318	U91318, Z98304, AL133245, AP000556, AB020871, AL031845, AL023575, AC005212, AC005857, AL035530, AP000467, AL031864, AL034417, AP000563, AP000211, AP000133, AL022330, AC003093, AL035417, AC005043, AC004032, AL049646, AC005180, Z75887, AC005251, AC004895, AL049554, AC006130, AL031056, AP000330, AC006270, AC006101, AC005884, Z83856, AP000257, and AP000256.
HTTAJ35	1506	707750	1 - 560	15 - 574	AA301200.
HTTAJ50	1507	509657	1 - 249	15 - 263	AA460110, AA279729, AA291197, AA301139, T06789, AW295422, AI700465, AA845564, and AI291478.
HTTAN57	1508	509453	1 - 292	15 - 306	AA300966, and AA301128.
HTTAS96	1509	961057	1 - 247	15 - 261	AA300600, and AA301000.
HTTAU82	1510	797726	1 - 296	15 - 310	AA300802, AA300767, and AC004559.
HTTBE25	1511	509128	1 - 256	15 - 270	AA300687, AA286758, AL139165, and Z70227.
HTTBH34	1512	530565	1 - 313	15 - 327	AA300493, AA300591, AF059569, and AL049778.
HTTBH41	1513	530562	1 - 252	15 - 266	Z42096.
HTTBH54	1514	530563	1 - 302	15 - 316	
HTTBJ94	1515	530564	1 - 311	15 - 325	AL046237, and AL045777.
HTTBN67	1516	578085	1 - 163	15 - 177	
HTTCA15	1517	869705	1 - 413	15 - 427	AC005833.
HTTCD03	1518	925390	1 - 378	15 - 392	
HTTCD71	1519	530393	1 - 112	15 - 126	AL049844.
HTTCL35	1520	529672	1 - 239	15 - 253	AA505142.
HTTCT34	1521	973210	1 - 1295	15 - 1309	AW192348, AA081773, H06122, C75208, W38676, AA302953, AI907561, AA311414, AA151050, AW411262, AA226372, AA297279, T50005, AA938031, AI276055, AI433141, AI814125, AA689289, AI264581, AI650824, AW235148, AI273243, AA340545, T50069, AW340759, AW088730, AI093394, W44759, W73928, AI242558, AI800707, AA421100, AA243847, AW265034, AA226593, AW294446, AI097360, AI302409, AI298574, AA770396, AI418623, AA122285, AI150958, R31691, AI969750, AI168830, AW236726, AI459694, AA936951, AA422134, AA150960, AA029400, AW305179, AA046886, AA226401, AI935787, AW118839, R24074, AI803011, AI564140, AI797634, AI671022, AA084054, AA031539, AI831233, AA046979, H79028, H05830, AA033515, AW296225, N70304, R31733, AW296783, H28027, AA334000, F32723, H54170, AA031538, AI826552, AA421099, AA766234, D60652, AI696661, AA913310, AW383613, AI077484, AW383609, AW236130, AA652326, AI191597, H77423, AI435580, AI302073, AI675809, H54014, AI973084, AW383535, AW239479, AA496314, AI971370, AA233111, and AA629153.
HTTDF50	1522	526385	1 - 293	15 - 307	AA301144.

HTTDF90	1523	917155	1 - 427	15 - 441	AW052029.
HTTDG36	1524	968131	1 - 347	15 - 361	
HTTDI21	1525	869686	1 - 341	15 - 355	
HTTDJ65	1526	973307	1 - 406	15 - 420	AC006030, AP000513, AB023052, and AC006140.
HTTDL38	1527	573641	1 - 289	15 - 303	
HTTDL45	1528	523452	1 - 291	15 - 305	AW292800, and AC007390.
HTTDL89	1529	959837	1 - 328	15 - 342	W22023, AC004765, and AB002342.
HTTDN40	1530	734318	1 - 373	15 - 387	AA182963, W39759, AA132990, H69405, R94355, T66121, H68623, H68650, N36314, R14722, AA166770, R70624, AA923755, AW385783, R69735, AA190899, R19750, T10743, H07954, H93885, AA164319, and AC005876.
HTTDN85	1531	783444	1 - 435	15 - 449	AL137653.
HTTDO19	1532	908937	1 - 320	15 - 334	
HTTDO37	1533	573685	1 - 431	15 - 445	
HTTDR91	1534	790336	1 - 549	15 - 563	AA252780, T84947, and AC005740.
HTTDR92	1535	573666	1 - 326	15 - 340	AC003046, AC002366, and AC003685.
HTTDS02	1536	920589	1 - 418	15 - 432	
HTTDX84	1537	921100	1 - 668	15 - 682	AA432195, AA435548, and AA431175.
HTTDZ54	1538	692608	1 - 286	15 - 300	AW163244, H89834, W06845, N42782, N42829, N31946, and A1190785.
HTTDZ91	1539	523206	1 - 300	15 - 314	A1762137, AW242639, AA044752, AA884207, AA235512, A1870472, D80100, D59403, W88874, AA481286, N92013, D31111, D31113, A1167596, R10048, AA906542, AW087683, R49500, A1361492, AF155112, and AL137478.
HTTEB33	1540	573719	1 - 336	15 - 350	
HTTEH58	1541	747943	1 - 307	15 - 321	
HTTEL50	1542	745985	1 - 196	15 - 210	
HTTEU68	1543	967819	1 - 1207	15 - 1221	AA134604, AA187575, T75572, AA083163, W42892, A1092672, T97891, Z44468, R34642, R14267, A1078644, AA354837, R48102, AA362636, R55924, AA497072, AW044159, AW377397, R17450, T78498, AA625142, R56338, AA258076, and R99732.
HTTEV62	1544	573614	1 - 272	15 - 286	A1828837, A1015418, and AA953392.
HTTEY64	1545	974107	1 - 450	15 - 464	
HTTEY67	1546	917903	1 - 1523	15 - 1537	A1869330, AW295435, A1208233, AA447451, AA844516, AA664002, N40294, W04890, A1925298, AA903925, AA447450, AW243978, H14692, H14587, AA360639, and AA732693.
HTTEZ34	1547	771602	1 - 498	15 - 512	
HTTFA16	1548	870198	1 - 394	15 - 408	AA160412, and D78751.
HTTFB60	1549	869666	1 - 208	15 - 222	AW298813.
HTTFG35	1550	778426	1 - 254	15 - 268	AA581033.

HTTFG83	1551	974284	1 - 698	15 - 712	AA063114.
HTTFH70	1552	757358	1 - 342	15 - 356	H64973, AA659316, AA649530, A1636734, AA047057, AA664924, AA157876, AA046906, A1940546, AW028376, H57802, AA420703, A1306717, AA019793, AA385652, AA359194, AA713538, AA713930, AA639056, AA837006, A1679759, AA135988, AA084148, AW019964, AA908682, W27084, AA602458, AA083850, A1679486, C75332, H62123, AA338238, AA055647, W85818, A1634466, A1890283, AC003973, AC006263, AF196971, AC007793, AF039907, U80017, AL049779, AC006530, AL022238, Z83820, AP000221, AL136295, AF011889, AP000084, AL049709, AC006142, AF109907, AL022721, AC004617, AL049780, AL049831, AL020997, AC004462, AC006211, AL049761, Z83826, AL031255, AL024498, AL133216, AC005529, AC006030, AC000134, AC004999, AC004934, AC007390, AL139054, AF111167, AC002314, U85195, AL109758, I59642, L77570, AC005346, AC002492, Z83822, AC006261, AF000658, L39891, AC007993, AC006064, AC005969, AC006950, U91327, AC007664, AL049759, Z97180, Z98949, AC007462, AC005484, AF045555, AC005821, AC006581, AC004659, AC002039, AP000355, AL035684, AC007157, AP000552, AC012099, AF001549, AL022316, AC006162, Z98044, AC005874, AF134471, AC005179, AC005527, AC007688, AC003086, AL049697, AL109984, AL078584, AP000550, AL049760, AC006023, AC004996, AP000692, AC001231, AC007022, AC002040, AC009288, AC007066, AC004876, AC005730, AC008018, AC005320, AL022394, Z82198, AC004148, Z75890, AL023281, AC005037, AC008039, AC006273, AC005516, AC009248, AP000299, AL079342, AC007684, AB023049, AC005031, AC004686, AC002366, AL022398, AC004019, AC006960, AC006417, AC003048, AL031577, AF038458, AC006079, Z81364, D87675, AC002310, AC005740, AC004913, AL096701, AC003071, AC000003, AC004491, AC005744, AL035587, AC004253, AL050307, AC005180, AC001478, AL117351, AC004890, AL031848, AC006241, Z98051, AC003982, AP000114, AC005722, Z97056, AL031432, AL050318, AC006538, AC005089, AC004750, AL049713, AC002070, AL096761, AP000353, and AL133163.
HTTFK90	1553	787599	1 - 551	15 - 565	AL637920, AL657055, AA772352, AW316972, A1676064, AA904483, T11417, D59503, D81111, D80014, D58283, D58246, D80258, D80043, C14227, D80064, D80247, AA809122, D80251, C06015, A1535686, D80253, D58101, D59502, AA514184, C03092, C14407, D80366, A1557751, D80522, D80022, C14331, H67866, C14389, D50995, D59610, D51423, H67854, D80157, D80439, AA305578, D59859, D80166, C14014, F13647, D80195, D59467, D59619, D51022, D80210, D51799, D80391, D80164, D59275, D80240, D80038, D59787, D80227, AA305409, D80188, C14344, D81030, D45260, D80248, D50979, D81026, D80269, AW178893, D80212, D80268, D80196, D80219, D51759, D80241, D59927, D80024, C15076, A1557774, D51060, D57483, D59889, D80193, D80133, D80045, D80168, AA514186, AA514188, D60010, D80302, D51103, D80378, C14429, D59317, AW177440, C14298, C14973, C14957, D59627, D59653, AW360834, T03116, D51213, D51221, D59474, A1525917, C14046,

HTTFL89	1554	974346	1 - 405	15 - 419	C16955, AW360817, AI525920, AW377671, AW375405, AW360811, AI525235, D60214, C05695, C75259, D59551, D52291, AW178907, AI525227, AW178908, D59373, AW178906, AW378533, D45273, AI535959, AW360844, AI525923, AA285331, T03269, AW179328, D51079, D59695, D80949, T48593, AW375406, AW378534, AW179332, AW360841, AW377672, AW179023, AW178905, AW366296, AW177731, AI525912, AI525215, AW378528, AW178762, AW179019, AI525242, AW352170, AW378532, Z33452, T02974, AW352120, AW352117, AI525925, T03048, AW178914, AW378539, AW378542, Z21582, AW367950, AW360855, AW176467, C05763, AW378525, D80228, AW179020, AW378540, AW377676, AW352171, AW178774, AW177733, AW179024, AW179018, AW378543, AI525237, AW177505, AW178781, H67858, D51250, AW352163, D51053, C04682, AW177456, C13958, AW178911, C14077, AI525222, AW178775, T02868, AW178909, F13796, AW179004, AW179329, AW178980, AW177728, AW178986, AW178754, AW369651, AW352158, Z30160, AI535961, D31458, AW177734, AA305720, AI910186, N66429, AW177508, T11191, AW179009, AW179012, AW177497, AW177722, AI525928, AI525216, AI525228, D80654, AB028859, AI132110, AF058696, A62300, AR018138, AR008278, A84916, A62298, A82595, AR060385, AR054175, I14842, AB002449, I50126, I50132, I50128, I50133, A70867, AR008277, AR008281, AR062872, AR016808, AR016514, X64588, X67155, Y17187, AR060138, A45456, Y17188, A94995, D26022, A26615, AR052274, A43192, Y12724, A63261, A43190, AR038669, A25909, A64136, A68321, AR066488, Y09669, AR066487, A67220, D89785, A78862, D34614, A30438, I79511, AR008443, X68127, AF123263, AR016691, AR016690, U46128, D88547, AR032065, D50010, AR008408, and AR060133.
HTTFL89	1554	974346	1 - 405	15 - 419	AC005551.
HTTFM17	1555	750942	1 - 430	15 - 444	AI457366, and AI023804.
HTTFM66	1556	950051	1 - 1145	15 - 1159	AA085574, AA490803, AA147472, AI239866, and AL049745.
HTTFS59	1557	825922	1 - 842	15 - 856	AA228367, AI176965, AA228376, AA004521, AA251249, R00504, AA303183, AW136898, AA448887, R00605, AA229970, H50956, AA345572, AA040486, AA004604, AA177117, AW247896, T74926, AA566080, and AF045584.
HTTFT08	1558	934460	1 - 441	15 - 455	AA301328, and H78684.
HTTFV93	1559	925544	1 - 393	15 - 407	AC006566.
HTTFW03	1560	923105	1 - 459	15 - 473	AI632236, AI279533, AI339379, AI806232, AA401419, AI356680, AW051296, AI096764, AA401395, AW008336, AI419077, AI423753, AI276550, AI435531, AW205745, AW104726, R60187, AI081767, AA830892, AI917002, AI806411, W03327, AW134602, H72137, H71911, H66942, H79399, AA507360, H66943, H81492, AA847135, H71435, H71434, AI824610, AI652697, AA829202, H72050, N32176, H71912, AA507323, H79288, R83711, AA886536, and AI652883.
HTTFX21	1561	924775	1 - 580	15 - 594	

HTTFZ70	1562	974066	1 - 357	15 - 371	
HTTHH05	1563	931004	1 - 592	15 - 606	AC004067.
HTTHU43	1564	953479	1 - 1053	15 - 1067	AI278633, AA423847, AI276946, AI291687, AA262654, H22961, and AA255728.
HTTIG04	1565	926752	1 - 390	15 - 404	
HTTIH23	1566	869636	1 - 472	15 - 486	AW401826, AW408670, AA488824, and AB020677.
HTTIH80	1567	869635	1 - 328	15 - 342	AC006443.
HTTIL06	1568	934089	1 - 765	15 - 779	Z25007, AI758350, D80247, D50979, AA305578, C14389, D59275, D52291, D80195, D59502, D80164, D80193, D80439, D59467, D58283, AI525903, D80227, D81026, D80269, D59859, C15076, D80022, D51799, C14331, D80166, D80248, D80253, D8H030, D59695, D51423, D59619, D80043, D80210, D80391, D80240, D80366, D80038, D59787, AA305409, C14014, D80212, D80188, D80196, D51022, D80045, D80522, D57483, D80219, D59627, D59927, H67858, D50995, D59610, AI525922, D51060, AA514188, D59889, D80024, D80302, D80268, D80133, D80378, D80251, D80168, D59474, D51103, C14298, AA514186, D80241, Z21582, D59317, D51213, D80157, T03116, D80258, AA809122, C75259, D80064, D31458, D59503, D45273, D59551, D59373, C06015, AI525914, F13647, H67854, C05695, C16955, T02974, C14077, T11417, T03048, H67866, D58246, AI525912, C03092, D80014, C14407, C14973, Z3452, C14227, T02868, AI535686, C14344, D52317, C13958, D51221, D81111, AI525907, C14957, Z30160, C14046, D51759, D59653, D45260, D58101, AI525242, AI557774, D60010, AI557751, AI525227, D51053, AI525235, AI525920, AI525917, N66429, AI525923, AA514184, AI525215, AI525216, AI525228, AI525238, AI525925, AI525237, AI525222, AI525969, AI535961, AR016808, AB028859, A84916, AJ132110, A62298, A62300, A82595, AR060385, AR008278, AR018138, AF058696, AB002449, X64588, I82448, I79511, I14842, AR054175, AR008277, AR008281, and AR060382.
HTTIN23	1569	869634	1 - 539	15 - 553	AC002549.
HTTIU05	1570	931015	1 - 573	15 - 587	
HTTIW81	1571	922817	1 - 434	15 - 448	
HTTIZ05	1572	930994	1 - 418	15 - 432	
HTTJA11	1573	839725	1 - 406	15 - 420	AI522185, and AI889003.
HTTJA47	1574	869618	1 - 417	15 - 431	
HTTJH13	1575	869615	1 - 297	15 - 311	AC004859.
HTTJM01	1576	913799	1 - 271	15 - 285	
HTTJQ06	1577	934130	1 - 397	15 - 411	AL046690, AL046714, AA301225, AW405562, AC005027, AL132774, AC005050, AC004409, AC006059, AC007785, AC004673, Z99496, AL033397, and AC002488.
HTTJX68	1578	974063	1 - 375	15 - 389	
HTTJY08	1579	958170	1 - 430	15 - 444	AI023584.
HTTKD44	1580	948750	1 - 434	15 - 448	AA300492, R69716, AA377913, AA096018, and AC003688.

HTTKF89	1581	960928	1 - 411	15 - 425	AA301180, AA300961, and AL035425.
HTTKG34	1582	915033	1 - 378	15 - 392	
HTTKK06	1583	974311	1 - 584	15 - 598	
HTTKL80	1584	974316	1 - 464	15 - 478	
HTTKN21	1585	974310	1 - 504	15 - 518	
HTTKN30	1586	920893	1 - 487	15 - 501	N24270, AA355038, W16809, W76580, AA442492, AA394009, AI061614, AA306378, AW327292, N39773, AA431265, AA022944, W16892, H69650, W16816, N95146, AA437055, AA333960, N42264, AA471293, N39663, AA429690, AA287514, N28024, AA336844, AA337096, AA442618, AW298810, T81379, W20041, N25823, AA282421, AA181314, AI038286, AA902825, AI093178, AI128035, AA092603, AI290898, D62144, N26891, AA846456, AA838697, AA640163, N40080, AA758626, W16976, AA939313, AW151976, N56324, AA927961, AI582147, AI223403, AA659796, AI348195, N26593, AA806403, AW118695, AA435600, AI187055, H60112, H98703, and AA022924.
HTTKP07	1587	911390	1 - 562	15 - 576	AI640500, AA035703, AF130247, and AF165138.
HTTKS13	1588	926795	1 - 470	15 - 484	
HTTKV17	1589	830008	1 - 416	15 - 430	AC005027.
HUDAM29	1590	529157	1 - 214	15 - 228	
HUDBZ78	1591	739638	1 - 366	15 - 380	AI799013, AW173341, AW072440, AI910986, AA620943, AA977595, AA913759, AI208578, and H56769.
HUKAA62	1592	503626	1 - 294	15 - 308	AA303037.
HUKAB80	1593	503445	1 - 335	15 - 349	AA300169, AA776941, and AC005841.
HUKAC72	1594	966804	1 - 296	15 - 310	AA300183, AW419202, H38334, AI124650, AA324325, H38499, AA299557, AA299817, AA663855, and M27444.
HUKAM82	1595	954420	1 - 309	15 - 323	AA299772, AA299548, and AA299549.
HUKAX07	1596	954359	1 - 258	15 - 272	AA299237, and AA299353.
HUKCC86	1597	529727	1 - 212	15 - 226	
HUKDH28	1598	531165	1 - 371	15 - 385	AC006055.
HUKDH50	1599	531163	1 - 315	15 - 329	AF064478, AB015355, AL034351, AC007529, AC005723, AC007684, AL020989, AC004448, AL008639, and AC002525.
HUKEH36	1600	531110	1 - 334	15 - 348	
HUKEH50	1601	531108	1 - 240	15 - 254	AI743421, AI807422, AI684708, AW104143, AA973066, AA843771, AA846889, AW135078, AI686018, and Z63492.
HUKEK55	1602	522213	1 - 546	15 - 560	AI085258, AA594171, AA731743, AA252492, AI866553, AW163561, AI028019, AA908826, AI479934, AI292039, AI701571, T32954, AI563944, AA987496, N91123, AA913053, AA748877, AA897110, T03349, AA903350, AA300185, AI268110, AA910894, AI199050,

HUKEO55	1603	714187	1 - 340	15 - 354	AI702521, T30992, D56255, R56442, Z45121, AA889837, W19847, AI559757, AW245526, AA905779, AA243398, AI871013, AL136295, and AF006264. AI249880, AI312131, AI377805, AL080243, U63630, AC05722, AL023653, AL109865, AC004805, AC006146, AL022162, AC004675, AF088219, AC001226, AC007216, AC002472, AB001523, AC005568, AL049872, AL022324, AL034420, U95742, AL034548, AF053356, AC006084, AL049779, AC005231, AL121825, AC005939, and AC004955.
HUKES11	1604	967604	1 - 168	15 - 182	
HUKFL69	1605	526819	1 - 352	15 - 366	
HUKFV41	1606	537530	1 - 289	15 - 303	AI830434.
HUKFX63	1607	946931	1 - 98	15 - 112	
HUNAD94	1608	575299	1 - 310	15 - 324	AA297031, AA298863, AA371410, AA837771, D51877, AI885465, AA077619, AA385775, AA297006, AW243808, F35684, T03928, H47368, AA599080, H79586, AA678472, AA632720, R83068, R92640, H85808, AW275432, AI223626, D51809, AI751191, AW028179, AA653291, AA187760, AI190648, H71738, AI525789, AI193417, AA584594, AI251034, AI254770, AI284543, AI054090, W39287, AI246061, H47736, AA445951, AI753365, R83708, H86399, AI510801, AI251284, AI251203, AI249853, AA788592, AI250552, AI985795, AW381198, AW381196, AI133238, AC008012, AC007363, U91325, AC004890, AL022394, AC002395, Z69733, AC004025, AL133249, AC005969, AC004865, Z99128, AC006197, AC008041, AC007666, AL118497, Z98880, AP000152, AC008033, AF049895, AC000052, AC007919, AP000567, AC004019, AL035454, AC000062, AL079342, AC002457, AC005740, Z82194, AC008123, AC002994, AL031311, U80460, AL122023, AL031114, AC007388, AF146191, AL035089, AC004081, AL049633, AF196969, AC006120, AL049843, AC009411, AL009175, AL135960, AI131016, AL032821, AC007022, Z97832, AL109653, AL033403, AL022726, AL022151, AL117339, AC007551, AC004979, AC005722, AC005828, U96409, AL022319, AB001523, AC007312, AC007023, AL121825, AL031663, AC008009, AC000353, AC006928, AC002429, AC005509, AL022578, AC004802, AL020997, AL022718, AC006515, AC004020, AC005908, AL133244, AC006317, AC006039, AL049830, U85195, AC004746, Z93930, AL133312, AC007372, and AE000658.
HUVBB90	1609	503042	1 - 330	15 - 344	AA296418, AA296426, AA302599, AI223784, AI792577, AC005280, AC002287, AC004517, AL031592, AC000353, AL109847, AL034419, AC004993, AC004882, AL079342, AC005529, and Y18000.
HUVBB93	1610	502903	1 - 266	15 - 280	AA296425, and AL121603.
HUVBC12	1611	933023	1 - 353	15 - 367	AA296246, AA296176, and AA296416.
HUVCO07	1612	928053	1 - 358	15 - 372	
HUVCO55	1613	868795	1 - 372	15 - 386	AA296238.
HUVCS14	1614	914768	1 - 317	15 - 331	T84347.

HUVCU71	1615	968663	1 - 266	15 - 280	AC005410.
HUVCW62	1616	535361	1 - 386	15 - 400	AA296264.
HUVDDB28	1617	535006	1 - 265	15 - 279	AA714267, and AL078634.
HUVDDB53	1618	509119	1 - 339	15 - 353	AA296198.
HUVDIC15	1619	921088	1 - 490	15 - 504	AL031281.
HUVDDB09	1620	707061	1 - 178	15 - 192	AW378735.
HUVDIF13	1621	961020	1 - 297	15 - 311	
HUVDIF84	1622	526248	1 - 339	15 - 353	AC005319.
HUVDIF88	1623	522823	1 - 340	15 - 354	AB002339.
HUVDI28	1624	530558	1 - 463	15 - 477	H29210.
HUVDI76	1625	719332	1 - 286	15 - 300	
HUVDL30	1626	530387	1 - 96	15 - 110	AW367572, AW376975, AW376867, AW367596, AI248747, AW449393, and AI367533.
HUVD025	1627	679477	1 - 439	15 - 453	N80985, and AC004134.
HUVD095	1628	530386	1 - 150	15 - 164	
HUVD026	1629	958027	1 - 590	15 - 604	AA435842, AA398811, and AC004111.
HUVDU51	1630	868660	1 - 279	15 - 293	AL009183.
HUVED35	1631	430750	1 - 732	15 - 746	AA166861, N56640, D59356, AB008681, and AP000500.
HUVED54	1632	534783	1 - 376	15 - 390	AL035405.
HUVED65	1633	527937	1 - 151	15 - 165	
HUVEN50	1634	530094	1 - 96	15 - 110	AF118069.
HUVEA55	1635	868779	1 - 515	15 - 529	AI460185, and AW270646.
HUVEB48	1636	967815	1 - 330	15 - 344	AA161447, AI583468, AA715433, AA630672, AW341978, AW021951, AI865278, R65651, AA640053, H63170, AA743445, AI253987, AA094320, AA482273, AL046777, AC006121, AP000513, AC002477, AC007308, AL022323, AL022237, AL049760, AF124523, AC005480, AC006480, AC004686, AC007227, AC005015, AC006080, AP000030, AC002375, AC002550, AL021808, AP000023, AP001052, AL133163, AC006530, AL049780, AL035422, AL035252, AC007637, AC007226, AL023284, Z93017, AL031311, AC004217, AL031276, AC002470, AC006511, AC002425, Z85987, AC005280, AF165926, AF001549, AC004098, AC008033, AL031055, AF030453, U95740, AC007066, AL109984, AL137191, AL031295, AC005088, AC005736, AF001552, AC005701, AC004491, AL049871, AF109907, AC006312, AC004890, AJ009610, AC004019, Z84487, AC016027, AC004526, AL133246, AC006115, AF001060, AP000031, AC006057, AC006316, AC006023, AL079304, U95743, AF196970, AC005071, AC007999, AC004887, AC005057, AL031281, AC005484, AC003969, AC005839, AC003101, AC006013, AL021937, AL133448, AC007738, AC004983, AC002531, U82828, AC004782, AC006014, AC002525, AC002073, AC005189, AC006160, AC004859, AC007421,

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HUVFB69	1637	868782	1 - 558	15 - 572		<p>AA077619, AI620756, AW068786, AA547979, AI613285, AA613225, AL039761, H57324, AI018726, F33126, AW007980, AA804334, AI732789, AI821355, AA721572, AL037777, AI383965, AI364836, T63368, AW406046, AA558488, N77307, AL038005, AA515733, AA663063, AW029515, H47719, AI557422, R19998, AI376406, AW008161, AI963183, AI624421, AW243945, R97239, AA831638, AI017733, AA017334, AI240919, AI682310, AA862014, AI308598, AA584207, AA032020, AA297789, AA086257, AA493497, AI672931, AA523695, AI053784, AI926656, AW068580, AA599532, R14787, AI694784, AA662905, H22767, R99944, AA565319, R85174, AI816058, AA301899, AA364150, AI472782, AA588353, AA935380, AW029251, AA573051, AA487152, AA225548, AL047645, AA526413, AI581277, AA773042, AI336771, AC003982, AC005412, AC005535, AF042484, AP000045, AL121652, AC005006, AL035413, AP000356, AC005899, AL031984, AC003070, U91321, AL121603, Z84496, AC005730, AC004832, AC006316, AC007637, AJ239325, AL078459, AF196969, AF196972, AC005057, AC007676, L81772, AC002107, AC002106, AC004042, AL050307, AC009247, AC006515, AC004983, Z83838, AC001643, AC002319, AL049743, AL022320, AL035659, AL096791, AL049856, AL049692, AC003037, AL049849, AC002351, AC005225, AC008064, AC002365, X82877, AC006463, AL034417, AF029308, AC007792, AP000333, AL031602, AP000173, AL121655, AC005549, AC004774, AC002299, AC004125, AC002072, AP000066, AC006536, Z82179, AC005519, AC009516, Z99716, AF024534, AC005379, AC004084, AC006006, AC003685, AL034379, AC004671, AC005751, AC007686, AC005071, AL109798, AL031593, AC005625, AC006163, AC003030, AJ239318, AC002126, AF038458, AC005841, AP000114, AP000510, AC004079, AC004263, AL049911, AC005393, AC004841, AL021578, AC007226, AC005828, AC006948, AC005874, AF134471, AC008041, AC007773, AC005500, AC004025, AC002394, U72787, AF015416, Z93023, AL034395.</p>

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HUVFC07	1638	952080	1 - 474	15 - 488	AI338539.
HUVFH03	1639	922064	1 - 350	15 - 364	
HUVFH32	1640	934003	1 - 316	15 - 330	
HUVFI03	1641	868776	1 - 162	15 - 176	
HUVFK11	1642	965765	1 - 425	15 - 439	AA449997, AI653493, AA654979, AI828405, AI275183, AW242031, AI754037, AA297496, AA557982, AI471691, H90844, AA501554, AI291124, AI146750, AI821881, AI821918, AA640430, AC004797, AL050318, AC007283, AC005274, AC004150, AC006449, AL031295, AC005412, AP000692, AC006509, AL031427, AC004148, AC005233, AC004098, AL050348, AC006111, AC005015, AC000025, Z93023, AL109627, AC000041, AC007191, AF053356, AC002563, AL031729, AL009181, AC004645, AL049539, AL035458, AC005969, AC007225, AC005907, AL008718, AC004531, AC004675, AL133448, AF181897, AC004966, AC003026, AL117352, AL096701, AC005940, AL121653, AL022476, AP001053, AL008630, AC006241, AP000052, AC005736, AC004647, Z83826, AL049697, Z85986, AC006023, AC007536, U91323, AC005527, AC007688, AL020993, AC005578, AF207550, AC005175, Z95115, AC004821, AC005972, AC005632, AC007731, AC006285, AF205588, AL049759, AC007386, AC005500, AP000344, U63721, AL139054, AP000114, AL049829, AC002059, AL049843, AC002470, AC007308, AC009516, AL117344, AL034400, AC007541, Z99495, AL035249, AC004134, AC004408, AL096791, AC016025, AC002045, AL117337, AJ003147, AC002369, AP001054, AL133396, AC008040, U95740, AC006480, AC006965, AC004073, AL049766, AL031587, AC007395, AC006057, AL049569, AC005519, AC005004, AC002477, AP000689, AC004854, AC007160, AC005529, U47924, AC004913, AL035072, AC004099, AL049650, AC000118, AL031984, AC004895, AC005057, AC005409, AC004814, AL049712, AC007919, L78833, U91326, AC006275, AC004752, AC002350, AC005411, AL049839, Z83844, AF111167, AC008372, AF001552, AC006441, AC007787, AL110502, AC003093, AC006960, AC016830, AC004583, AC006064, AL133485, AL008719, AC004874, U82828, AP001052, AC007193, AC005037, AF200465, AC009509, AC007686, AC004686, AL024498, AB016897, AC002310, AC005031, AL031733, AC003104, AC004791, AC020663, Z95116, AC005261, AF196972, AL117339, AC005377, AC005954, AC007011, AC004491, AL035587, AL022316, AL122020, AL034420, U91321, Z93020, AC002073, AP000167, AC006930, AC006071.

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HUVFK58	1643	868784	1 - 772	15 - 786	AI797913, AA699643, AI583734, and AA010369.
HUVFL71	1644	958059	1 - 523	15 - 537	
HUVFQ03	1645	922727	1 - 457	15 - 471	
HUVFR02	1646	918233	1 - 564	15 - 578	
HUVFT28	1647	870617	1 - 829	15 - 843	AA076812, F12628, R10205, AA331552, AI752258, R86677, and T74459.
HUVFT50	1648	868769	1 - 357	15 - 371	R06515, and AC008116.
HUVFZ06	1649	933942	1 - 408	15 - 422	AW303494, and AB032978.
HUVGZ77	1650	909169	1 - 370	15 - 384	
HUVHB35	1651	868751	1 - 342	15 - 356	AI942325, AI672318, AI672319, and AB011665.
HUVHB59	1652	963129	1 - 388	15 - 402	AC005683, and AF172277.
HUVHC93	1653	908555	1 - 404	15 - 418	H98236, and AC005940.
HUVHD88	1654	868697	1 - 145	15 - 159	AA412491, AA412659, AA669386, T93130, T91516, and AB023189.
					AA658406, AA584733, AL038606, AW189113, AI524360, AI589230, AC006512, AC002994, AC003663, AC006312, AP000104, AC005907, AI109956, AP000272, AC007242, AC006050, AC005632, AC004675, AP000359, AF088219, U91322, AC003051, and AC005952.
HUVHG80	1655	968507	1 - 375	15 - 389	AC002076.
HUVHI07	1656	952090	1 - 508	15 - 522	AA551131.
HUVHO40	1657	924621	1 - 473	15 - 487	AA120795, AJ003560, AA358990, AW373532, AB014585, AL096767, AC004527, and AC006557.
HUVHU74	1658	868649	1 - 348	15 - 362	Z98036.
HVCAZ38	1659	969208	1 - 1151	15 - 1165	AA477501, AA479873, AI003611, AW270619, AI7555214, AI754567, AA584489, AI754105, AI783911, AI962030, AA904275, AI620585, AI570943, AA779783, AA262752, AA013168, AW277253, AW438856, AL079734, AA582554, AA535216, AA019973, AI491765, AI872216, AW439703, D26361, AP000493, AC007938, AC004019, AC006210, AC003957, U47924, AF106564, AC005529, AC006077, AL031311, AF038458, AC006312, AC005578, AC000052, AL031680, AC004150, AF196779, AC005694, AC007666, AC005295, AC004895, AC005368, Z93023, AC005755, AC006006, AF053356, AC005682, AC005972, AC005306, Z82172, AC005231, AC005081, AC007435, AC004972, U62293, Z83844, AC004973, Y18000, AF207550, AL035361, AL050306, AC004263, AL121655, AC004686, AC004999, AC004812, AL049766, AL078587, AP000152, AP000502, AC010206, AB015355, Z99755, AP000501, AL121603, AC003006, AL034402, AF111169, AC005225, AC005399, AL034429, AP001053,

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HVCBV04	1660	925844	1 - 618		15 - 632
HVCC81	1661	933449	1 - 49		15 - 63
HVCK04	1662	925796	1 - 903		15 - 917
					AA130954, AI826639, AA149522, AI625572, AI452441, AI653591, AI305234, AI433556, AI366037, AI076932, W60508, AI298406, AW249838, AA693895, AA932571, AI248312, AW136383, AI420053, AW250502, AI216563, AA678309, AA426066, AA937788, F31582, AA340275, AA204645, R11867, AI570112, AI692968, R60411, AI000109, AA130824, AA207010, W56198, AW382487, AW382451, AW392670, AW372827, AW363220, AW384394, AL119443, Z99396, AL119391, AL119497, U46351, U46349, AL119483, AL119319, U46347, AL119484, AL119363, AL119457, U46346, U46350, AL119324, AL042965, AL119444, AL119355, AL119396, AL119439, U46341, AL119341, AL119335, AL119522, AL119418, AL119464, AR066494, A81671, AR069079, AR060234, AR054110, and AB026436.
HVVAC41	1663	949141	1 - 259		15 - 273
HVVAJ01	1664	914354	1 - 479		15 - 493
HVVAJ06	1665	933675	1 - 375		15 - 389
HVVBG19	1666	968967	1 - 541		15 - 555
HVVBK45	1667	964102	1 - 1441		15 - 1455
					AI751508, AW439242, AI858347, AA954665, AW173684, AA639199, AI633169, AW304822, AI828611, AI088904, AI923258, AI635118, AI952782, AI683485, AI635010, AI963627, AI278264, AW129973, AI860650, AI373090, AA642700, AI860395, AI982534, AI637577,

					AI561081, AW304817, AI167846, AW130866, AA747281, AI984745, AW379208, AI683773, AA587659, AW058417, AI267698, AI986135, AA488133, AI744496, AI684490, AI559255, AA488134, AI887129, AA282616, AI274756, AA730687, AI472334, AI492872, AW150281, AW169998, AA970450, AW055340, AW193022, AI288077, AI955042, AI858187, AA978256, AI189233, AI888974, H01983, AA130169, AA644170, H01972, AI273008, AI273026, F09244, R70971, AW391166, AI873591, AI399762, AI565023, AW189754, AI824564, AI634443, AI275201, AA907212, T96248, T93742, Z39255, AI873453, R70923, F11589, AA918265, AI284207, AI567328, H91570, AI868395, RI2808, AA354807, R59470, AI624071, AI611218, R59469, AI636153, AA337310, AI954448, H13229, R32680, AI886562, AI961717, AA255886, AA694475, AA854659, AA256684, D60252, R41517, R28489, AI347373, AI889488, AI309793, AI478725, AA287318, AI691017, AI768787, AI418367, AI819921, H24906, AA634601, H26324, T24624, AI870106, C02323, AI479533, AI983094, AI566584, Z43173, AA629599, Z98172, Z84466, and AC005225.
HVVBK72	1668	933167	1 - 967	15 - 981	AW367808, AI016826, and AL135700.
HVVBY44	1669	917559	1 - 228	15 - 242	
HVVCO01	1670	913996	1 - 659	15 - 673	
HWLHU68	1671	957834	1 - 1601	15 - 1615	AW364014, AW364012, AW364015, AW364019, AI760785, AI384093, AI224905, AA282933, AI267509, AA513728, AA729606, R80458, N76465, N59362, AA334630, AA3300682, R69849, R80659, AA573139, H86676, AA427982, AI499874, R31977, AI351352, D61921, AI091339, AA310325, AI051323, AA830587, N67319, AA449856, AA621436, N93060, AW134482, AI694673, AI161320, AI623166, AI582177, AW241458, AA648966, AA724337, and AB033047.
HVVDTO4	1672	925793	1 - 286	15 - 300	AA811233.
HVVBY08	1673	957658	1 - 608	15 - 622	AA481033, AI352156, AA845263, AA918987, AA534490, AW089740, AI718613, AA845628, AA609823, AI369407, AA631989, AI669939, AI310130, AW007165, AA609822, AI620598, AI310317, AI718649, AI693036, AI168639, AI004446, AI253744, AW081227, AW005641, AI097314, AW235502, AA738077, AI440490, AA481085, AI198174, AA121509, AI018313, AI167316, AA601606, AI092025, AA989671, AA705106, AA402875, AA532756, AA872342, AW081239, AW081228, AA953907, AA215299, AA588197, AW262214, AA975943, AA580166, AW405706, AI915786, AI762484, AI081256, AA927941, AI698971, AA927751, AW009088, AA524140, AI695474, AI364551, AA214505, AA722938, AA923824, AI240069, AA631636, AI468059, AA358257, AA743585, AA382416, AA233136, AA729480, AA595320, AL119399, AL119511, AL119457, AL042544, AL119324, AL042382, AL043152, AL079794, AL043168, AL134524, AL037081, AA865126, AL042866, AL120853, AW051212, AI637584, AI433157, AI702073, AL079741, AI591420, AI493567, AW051088, AW168828, AI590575, AW169132, AI673363, AI610690, AI352497, AI698391, AI889189, AI633125, AI915291,

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HVVBM06	1674	933528	1 - 466	15 - 480	AI685069, AI378607, AI126015, AI129820, AA912338, AI367538, AW192295, AA495868, and AI738723.
HUVHL82	1675	912011	1 - 567	15 - 581	AI761350, AF039240, AI352375, AI206857, T25311, AW291067, AI090441, T25310, W39573, and AC004596.
HUVHI06	1676	952479	1 - 2268	15 - 2282	AW188421, AI810011, AW241649, N51726, AA449707, AI275102, N66707, AI299870, AI805173, AA448561, D82294, AW002169, AA523264, AW450305, N33880, AI929539, AI888456, AA912441, N25245, AA909431, H13878, AI362098, H17359, AW020771, AA858024, AA954574, AA012893, H17330, H08372, H08373, N51811, H08249, H40727, AA828659, H08148, Z45445, AA447120, AA828725, AA354903, AA736863, Z41152, AA172308, AA247943, AA581242, AA019451, H13835, AA336350, AA171992, T16753, AA337210, AI160120, AA854342, AA935605, AW086477, AI242421, T49472, AI471813, AI803581, AI301683, AI287719, AI803133, AI752956, AA996171, AI983147, AI136130, AA906744, AW136726, AA482550, AI363029, AA926759, AA448845, AA287077, AA910010, AA885946, AA906319, AA429360, AA969237, AI005339, AL037854, AW246747, AA808249, AI282196, AI276053, AA737505, AW015432, AI872692, AA166813, AW250179, AA773516, AI253632, AA670020, AI368453, AW275936, AA608627, AI263811, AI985149, AA833795, AA879424, AI886945, AL037427, AW026473, N25721, AW183174, AW082723, AL037853, AA553414, AI809312, AI186804, AI005449, AI986314, AI673381, AI017892, N48321, AI919513, AI468411, AA887602, W60356, AA169201, AI445179, AA554323, AA705759, AI686271, AI651379, AI742846, AA533769, AA702089, W45427, AA724285, AI391610, AA824443, AI352069, AI869500, AI420348, AA599184, AA744761, AL037220, AW079854, AA417981, AW337696, AI453528, AA372237, AI095475, AA127848, AI445148, AA581188, D82430, AI363934, AI860112, AA847002, AI743438, AI919040, AI469498, AA577316, H56183, AA640332, T03741, AA897496, T60053, AI827644, AI916823, AA715407,

HUVGP05	1677	930892	1 - 384	15 - 398	AA833676, AC006238, AF044670, and AF157497. AW293310, AI761633, AA721086, AA488897, H86783, AW296923, AA648257, AA906315, H84926, and AF091457. H15460.
HUVFP71	1678	950681	1 - 431	15 - 445	AA368455, AA861915, AA367693, AI000735, D31762, and AL049611.
HUVFI01	1679	945834	1 - 1366	15 - 1380	AA235432.
HUVFE03	1680	922889	1 - 692	15 - 706	
HUVDO18	1681	868783	1 - 299	15 - 313	AI003772, AW304257, AI624133, AW149036, W45510, AW328027, AW069137, AA375087, and D84488.
HUVDO11	1682	967813	1 - 263	15 - 277	
HUVDO07	1683	954224	1 - 301	15 - 315	
HUVDM27	1684	521938	1 - 342	15 - 356	AC004954, and AC004084.
HUVDH61	1685	526590	1 - 331	15 - 345	AA664604, AA568204, AA570740, AA483606, AI446623, AA315361, AL042373, AI569510, H91062, AA449669, W03333, AI801505, N55515, AA603413, AI889579, AI431513, R51582, AI300054, AI253376, AI278089, AW236163, AI356440, AA916177, AA757426, AA130647, AI754170, AI536834, AA513846, AW069412, AA326824, AI627614, T73016, AI284595, AA745470, AA084609, AW406659, AI583106, AI635609, AA401963, AC006129, AJ236701, M87914, S42653, AC006251, AC005368, U62317, AL035587, U96629, AF095725, AC005261, AL080242, AC006468, AC005747, AC005520, AC007283, U80017, AC005585, AL021977, AC007193, AC006449, AC005940, AL022336, AL031283, AC006312, AL031602, AC004999, AC002544, AC002400, AP000240, Z98941, Z94802, AL035458, AC004491, AC006276, Z98051, AL022165, AC005722, AL031311, AJ011930, AC006064, AC003688, AC005484, AC004814, AC006111, AC004757, AC003080, AP000555, AI031848, U62293, AC000353, AC004815, AC004890, AL135744, AC006071, AC005839, U91318, AC002310, AC005531, AC007510, AC005086, AC004922, AC004797, AI246003, AC006285, AC006126, AL022311, AC006088, U91325, AL031228, AC002996, AC004593, AC000354, AC005412, Z82248, AC002044, Z84466, AC002418, AL121658, Z98742, AC000086, AL049779, AP000065, Z96811, AC005971, Z98304, AC004832, AC005057, AC004386, AF023268, AC002472, U95742, AC002347, AL035659, Z99943, AC005746, AL121653, U50871, AC005702, AP000156, AC005212, AC004659, AC002316, AP001053, AC007292, AL034555, AP0000096, AC005519, AC007225, Z84480, AC003109, AL031775, AC007216, AC004881, AJ003147, AF121781, AC002286, AL021453, AL022320, AC007421, AB022537, AC002115, AC002059, S79349, AL079340, AC002366, AP000014, AC006501, AF124523, AC00121, AC003966, AC006130, U52112, AL031591, AP000696, Z95115, AP000053, AP000121, AC003966, AC006130, AC006343, AC000026, AC005823, U33956, AC004106, AL109827, AC005280, AL080243, AP000251, AC004821, U91326, AP000355, AC009247, AC005031, AC006020, AL022316, AC005480, AL021579, AC005529, AF196972, AC005763, AC007363, AC002314, AC002430,

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HUVCU26	1686	974232	1 - 688	15 - 702	AC005342.
HUVCU76	1687	522660	1 - 133	15 - 147	
HUVBC21	1688	671479	1 - 702	15 - 716	
HUVA46	1689	667943	1 - 603	15 - 617	AI629014, AI015875, AA020867, AA020818, W15455, AI392776, W39642, AI248691, AI022556, AA296410, AA017442, R02316, and AF088026. AA302686, AA302685, AA704009, AA568204, AA570740, AA483606, AI870453, AI720968, AW078909, AA550850, R55078, AA829036, AA719073, AW089322, AA484892, AA488746, AA935409, AI340151, AA676592, AI174456, AA320149, AL035400, AC007221, AC007425, AL020995, AC005015, AC007731, AC005500, AC004650, AC007308, AC005274, AC002470, L77570, AC002477, AL133500, AC005696, AC005280, AC012384, AI251973, AC007055, AL096701, AC005722, AC004067, AC004000, AL109963, AC005088, AL117330, AL133353, AC005740, AC005081, AC002287, AC002070, AP000128, AP000206, U85195, L78810, AL132777, AL022323, AC006160, AC010170, AC005921, U91321, AC004913, AC004382, AP000245, AL132987, AC003108, AE000658, Z93020, U91323, AC004832, AC005919, AL117344, U91322, AB023048, AL031276, AL030996, AC004966, AL050318, AC007676, AC005484, AC006480, U95740, AL121653, AC005529, AC007052, AC004876, AL050332, AC005844, AC005874, AF134471, AC003029, AL031281, AC002302, Z83844, AP000049, AP000116, AF001548, AC002299, AP000553, AC005971, U91326, AL133245, AL121603, AC006344, AC007172, AL021391, AC005527, AL021807, AC005005, AP000311, AL020997, AC002059, AC006538, AL031588, AC002369, AC006511, AL035079, AC006057, AC005071, AC005200, Z95116, AF045555, AC002544, AC006277, AC007637, Z93930, AC002350, AC007546, AC004967, AC004878, AL031594, Z93023, AC006023, AL049569, AL133448, AC004491, U80017, AC005011, AC008015, AL033527, AL049761, AL049760, AF190465, AC007011, AB023049, AP000008, AC007934, AL035422, AC005102, AC005821, AL031289, AL109802, Z98051, AP000704, AC005225, AC006208, Z85986, AL035683, AL031289, AC007041, AC005920, AC000052, U62293, AC004531, AP000692, AF196969, AP000121, AC006312, AL034429, AC006254, AF111169, AC007030, AC005906, AF109907, AC005324, AL133382, Z86090, AL049776, AC008018, AL008716, AL022316, AC003663, AP000552,

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HUNAK12	1690	839574	1 - 421	15 - 435		AA757367, AA296644, and AC006327.
HUNAG41	1691	711543	1 - 473	15 - 487		R19731, H08375, H06407, R54527, A1654477, AA298292, and A1683415.
HUNAF22	1692	800452	1 - 422	15 - 436		AA298987, and AC006222.
HUNAF20	1693	961527	1 - 467	15 - 481		AA528216, A1347038, A1308941, AA583432, AA412292, A1147693, AA632915, AA836857, AA018749, AA135185, AA516435, AA916348, AA514541, N62509, AA470014, A1350971, R42401, H17978, AA299011, A1207239, AA349833, AA494556, F12523, AA290708, and AF184971.
HUNAE95	1694	796691	1 - 411	15 - 425		R68794, T89302, R64326, R78900, AA299021, AW021631, R26617, and A1820562.
HUNAE76	1695	524239	1 - 308	15 - 322		AA298749, AW078909, AA742815, AA557686, AC004132, AC008372, AL022238, AC006430, AC005011, AC005899, AC002351, AF001549, AC004821, AL035420, AC006441, M89651, AC005746, AJ003147, AL031276, AC005969, AL009031, AC002326, U91318, AC004837, AC000387, AL034423, Z15025, AC003101, AC005037, AC005184, AC004526, AC018633, AP000215, AL031295, AL008718, and AP000502.
HUNAE02	1696	921132	1 - 429	15 - 443		AA502008, AA298860, N59191, A1559794, A1218041, A1805928, N59181, AW188364, AA470022, H29622, A1216757, A1015520, A1202594, AA458483, AA565254, AA883777, N89710, AW340697, A1288448, AA588588, A1344556, A1248194, A1469895, A1954555, R89606, A1149444, AA505427, AW118040, AA886990, N30779, AW206450, A1800674, AA343608, A1761704, AA514300, AA581058, and AF151848.
HUNAD10	1697	968590	1 - 479	15 - 493		AA258009, AA299129, C02926, N85987, AA630672, A1499588, AW023990, A1636730, AW196064, AA380354, AA588001, A1818231, A1745151, AL045808, AL046156, AW341978, AA903253, AA515457, AA308716, AA575911, AA532700, A1494539, A1537772, AL046266, C15060, AA715201, N53062, AA370455, A1524360, AA487621, A1754544, N94065, AA488746, A1355556, N23504, AA480574, R73754, AW081194, AA531580, AL138182, AA618452, W47183, AA580808, AA345064, H69765, F00440, A1684097, A1817516, AA559241, A1908575, AL119724, R43288, AA833896, AA833875, H12383, AA402129, AA502991, A1306232, R65651, AA806762, AA604840, AW089322, A1174891, A1002744, AA463590, AA476397, AA719073, A1623423, H78032, AW085718, AC012627, AL020993, Z93017, AF052041, U78308, AF095725, AL121655, AL049631, Z99128, A1035415, AL035652, AC005377, AF111169, AF003529, AL096766, A1246003, Z95152, AL009179, AC006353, AL117355, AL121653, AC004655, AC005037, AC006059, AL031279, AL031289,

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HUNAC68	1698	753817	1 - 190	15 - 204	AA299084, AW058660, R79123, and AI955484.
HUNAB76	1699	968754	1 - 457	15 - 471	T78720, T85868, and AA299178.
HUNAB42	1700	714264	1 - 278	15 - 292	AA299202, AW382627, and W69280.
HUKFS69	1701	754186	1 - 276	15 - 290	N98250, and AL021068.
HUKFL89	1702	574525	1 - 457	15 - 471	AI027884, N90218, W56483, and W38946.
HUKFL71	1703	760581	1 - 227	15 - 241	AA348602, AW188860, T17332, AI634716, AA586433, AI049701, AI559282, AW238212, AA728938, AA806804, AI564301, AI002762, AI623364, AW068580, AI872000, AA531596, AW194077, AA758131, AW003612, AI365625, AI620266, AA720582, AA363003, AA628740, R61195, AA713705, AA626840, AA713714, T30418, AA827383, AI798242, AA179663, R49266, AW190484, AI075249, AI819262, N40092, AI188049, AA351808, AI475870, AA683091, AC006485, AL035422, AC005323, AJ003147, AL121754, AL035634, AL133371, AC007686, AC005180, AC002551, U07563, AL021578, AP000514, Z93241, AC005386,

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HUKFL52	1704	574523	1 - 482	15 - 496	AW303688, AC002302, and AL117325.
HUKFK53	1705	577349	1 - 436	15 - 450	
HUKFE56	1706	574381	1 - 213	15 - 227	W30961, and AA284307.
HUKFD95	1707	796014	1 - 446	15 - 460	AA259075, AA251698, and Z56473.
HUKEY01	1708	921504	1 - 333	15 - 347	AA913741, AI052134, AA838729, AA418342, AI368697, AA156454, AI275854, AI554346, AW193440, AA564981, AI274286, AA969728, AI920804, AI435811, AA410342, AI360949, W04701, N25790, AA115096, N23736, AA193407, N58849, AI858171, AA630452, AA649290, Z24907, AA757161, AA630461, AA780577, W15321, AI245223, AA363098, AI038657, AA860500, AA993680, AA435925, AI439836, AA651840, AA279471, AW338576, AA342107, AA676504, AA854457, N48087, AI539628, AI089644, AI095714, AI373864, AA639258, AI567507, AA432267, AA194632, AI280712, AA890333, AA890563, W72009, AI745574, N91475, N75263, C00067, AA302403, and AA431256.
HUKER62	1709	772501	1 - 547	15 - 561	R51351, AA534218, AA580300, AI284322, H78278, AI610392, D52671, AA115034, AI299062, AA778315, W73534, AA393903, AI290762, AI521482, AA115506, AI439629, AI475831, AI688331, AA764845, AI285054, AA027198, AI344564, AA830343, AW103497, AA435644, AW152418, AI814349, AI953851, T87095, AA865531, AI937550, AI992099, AI492575, AI968561, AI990835, W46791, AI336624, W46919, AI380956, W73259, AI675500, AI685131, AA634802, AA482973, AI669123, AI973010, AI201952, AW262269, AI352386, AI470518, AI337432, AW274833, AI783962, AA987852, AI470225, AW083650, D61500, T33520, AI885985, T03350, AW150047, AA350468, Z38276, N26529, AI864257, N21584, R32096, AI372555, AI372554, H78277, AA045465, AW440715, AI620909, AA384495, AA046535,

HUKEP18	1710	957456	1 - 838	15 - 852	<p>AW015422, AI336885, Z69667, and AC004754.</p> <p>AA203189, AI057441, AW139922, AA719156, AI653844, AW104223, AI208345, AI535660, AI536138, T18597, D80045, AI535639, D59751, AI557262, C15076, D80164, AI557084, D59467, R29657, C14331, D80193, AI526078, AI525856, D81026, C14429, AI541365, D59787, AA585439, C14389, AI525556, AW366296, D80195, D80227, D59502, AI557533, AI525316, D50979, D81030, D59275, R45895, D80269, AI541205, D59927, D80022, D80188, D58283, C15406, D80166, D51799, D59859, D59619, AI525500, D80210, D80391, D80240, D51423, D80253, D80043, AI557864, D59610, AA305409, D80212, D80038, D80196, D80219, D57483, AI905856, D80366, D80378, D59889, D50995, AA585098, D52291, D80241, D80251, D80024, Z32887, AW177440, AI541356, AI557731, Z33559, D51022, AI557602, AA305578.</p> <p>AW375405, C14407, AW378532, R28735, R29445, D51060, D80522, R28967, D53161, D57491, T03269, AW178893, C14014, R28892, AA585378, AA585325, C75259, AA514188, AW179328, R28965, AI557155, AA585101, T11417, R29218, Z32822, D80248, D54897, D51250, AW369651, AI557751, AI541535, AA514186, AI541346, AI535686, D80134, AW352158, AI540903, D58253, AI557809, AI540974, AW375406, AW178762, AW178775, AW177501, AW177511, D80133, AA969188, D80258, AW176467, AW360811, D80268, C05695, D61185, AI557082, AA585356, D60765, F13647, D60844, C14077, AW352117, AI546829, AW377671, AI557408, AI910186, D80132, AW378540, D80302, AI526184, AW360844, AW360817, AW378534, AI541034, AW179332, AW377672, AW179023, AW178905, C06015, AI541517, C16294, T48593, AI546875, AI546999, AI557241, D80439, AW352171, Z21582, D59373, AW377676, AW178906, AW352170, AW179018, AI541321, AW179024, AW177731, AI557734, AI557317, D80247, AW178907, AW179019, D51213, D81111, AI557787, AW177505, AI546971, AW179020, AW360841, AW178909, D59627, AW177456, AW179329, D51103, AI557727, AW178980, AI557852, AW177733, AW378528, AW178908, AW178754, AI541374, AI526194, AW360834, AW352174, AI536070, AI546945, D80014, AW179004, AW179012, AF100707, A62298, A62300, A82595, A84916, AR018138, AR038855, Y17188, U87250, AR016808, AR062871, AI132110, I19525, Y17187, AF058696, A25909, X67155, D26022, AR008278, AB028859, A67220, D89785, A78862, D34614, X82626, A94995, AR031365, D88547, I82448, Y12724, AB002449, AR025207, AF006072, U94592, AR016514, AR060385, A43190, A44171, AR031358, A30438, Z30183, X68127, AR008443, A82593, AB012117, AR050070, AR062872, AR038669, I50126, I50132, I50128, I50133, A85396, AR066482, AR066488, A85477, AR060138, A45456, A26615, AR052274, A86792, X93549, D50010, Y09669, A43192, AR025466, I14842, D13509, AR066490, AR066487, I18367, AB023656, D88507, AR054175, X76012, AR016691, AR016690, U46128, AR008277, AR008281, A63261, AR008408, A70867, AR017826, X82834, I79511, U79457, A64136, A68321, AR060133, AF135125, AF213384, AF123263, AB033111, AR032065, AR060382,</p>
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HUKDY02	1711	920815	1 - 480	15 - 494	X93535, and AR008382.
HUKDU47	1712	719465	1 - 367	15 - 381	R54146, and W72450.
HUKDGI0	1713	968333	1 - 393	15 - 407	H56528, and W27624.
HUKCP30	1714	690933	1 - 296	15 - 310	Z21273, and Z21324.
HUKCO11	1715	967742	1 - 436	15 - 450	R93336, AI364837, and AI871934.
HUKCL85	1716	529718	1 - 336	15 - 350	AW188043, AA743890, AA641852, AA654170, AA494552, and AA824490.
HUKCC25	1717	529723	1 - 246	15 - 260	
HUKCC15	1718	518537	1 - 112	15 - 126	
HUKAT59	1719	628540	1 - 385	15 - 399	
					AA299333, AA299334, AA488225, AI761274, W39643, AA436997, H26851, R69372, AA42825, AA133785, R48022, N78459, AL046919, AI659107, AA922133, W15236, F02924, AA135871, AW242187, R45109, AI355457, AI937442, AI270750, AI869489, T16709, H04785, F02239, R36219, AA938012, AI540377, T30366, AA491517, AA897754, AA972881, AA902408, H19244, Z39481, AI627407, AA133786, AI720129, R56889, AI911499, AI334362, H16569, AI285897, AI362708, AI148478, AI890959, AI961584, AI625445, AA099547, AI864641, AA947105, AW295635, AW304383, AW183032, AA580304, AI338026, AA725780, AA701287, AI815089, AA910649, AA059396, H10768, R47916, AI613048, AI827547, AA488171, AI362313, R60948, AI351348, AI268730, R69373, AA932084, H17326, H75830, D56341, Z43600, and AA099546.
HUKAQ76	1720	502711	1 - 337	15 - 351	R02387, and AA299632.
HUKAO47	1721	502911	1 - 367	15 - 381	R08548, AI360159, AI445049, AA299487, and AA831602.
HUKAM19	1722	672076	1 - 315	15 - 329	AA299796, and AA299795.
HUKAM18	1723	502912	1 - 636	15 - 650	AA166965, AI143571, AI187051, AI633250, AW135626, AI468530, AI916114, AA299797, and AA299798.
HUKAL44	1724	716927	1 - 390	15 - 404	AA083174, AI344586, AA299808, and AI275232.
HUKAJ91	1725	790487	1 - 146	15 - 160	N89673, AA877587, N89666, AW275503, AA548632, AI433318, AI800226, AI913521, AW235557, AI033607, AI741530, AA299661, AW003738, AI431440, D59328, AF108205, AF106698, and U67321.
HUKAJ83	1726	524257	1 - 316	15 - 330	AA299762, AA299761, AA535406, AA063173, AA534010, M86120, AW069510, AA947547, AI281697, AA310158, F17891, AA584201, AI358431, AA552843, AI367975, AI754955, D51681, AA846952, N27763, AA367986, AA516226, AA866015, AA488746, D52044, AI653905, AA362349, R89904, AC004142, AL031846, AL031255, U78027, AL031577, AC005237, AC007308, AC004019, AC005578, AC000052, AC005971, AC007216, AC005703, AF000692, U95742, AL109984, AC005288, AF111168, AC005081, AF000115, AC004234, AL022313, AL020997, AF000553, AC006064, AC004876, AC004895, AL121653, AC005523, AC003695, AC009516, AF030453, AC005071, AL139054, AC006071, AC007536, AC005778,

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HUKAD77	1727	772734	1 - 409	15 - 423	H96061, AA300129, AI147406, AI189973, AA431411, and AI078297.
HUKAB63	1728	625273	1 - 195	-15 - 209	AI079608, AI807065, AI952291, AI590123, AI090727, AI016788, AA456134, N20016, AA977594, AI970077, AW029554, AA635175, AI680564, AI474417, AW339144, AI933942, AW152328, AA149927, AA303069, AI864866, H98815, AW170581, AA699755, AI391578, - AW009047, AI982927, AA576948, AA485634, AA428599, AI016186, AA824314, AA991678, AA910276, AA576748, AA479608, AA829399, AA398673, AA933886, AA922521, AA868264, AA620744, AA303070, AA662449, AA568243, AA211758, AA913101, AI161248, AI797204, AA644052, C06116, AI693943, AA476960, AI799459, AA160700, AI673693, AI890207, AA642505, AA526838, W86624, AI241307, AI969413, W57802, AA602638, AA922005, AA954133, AA514739, AA838009, AI890528, AA909312, AA620353, AI423401, AA884139, AA192820, AI918960, AW236180, AA463209, AA621214, AA574061, N29954, F33718, AA913537, AA777231, AA864549, AA432235, AA703595, AI148263, AA868797, AA788644, AI084525, AI024640, AA299468, and AL137631.
HUKAB25	1729	677470	1 - 461	15 - 475	AA303079, AI127017, AA702731, AA659016, AA316535, AA365415, AA304577, AA411655, AW170716, AI969252, AI264137, AI907629, AA603883, AW193546, AL120502, AW162022, AA016286, AA663086, AA661948, AA665330, AA663115, AI985942, AA640204, AI255015, AI255004, R10260, T89571, AA128969, AI053977, AI054418, AI343078, AW268322, W85860, AA976584, AA826177, AI708663, AI671052, AI719434, AA504355, AA443426, AI189872,

						AW419126, H21137, AA634238, AA218645, T62975, AI686563, F17700, AL045709, AA879430, AL031682, AC004963, AL008721, AL020995, AC005527, AC005529, AL049780, AP001052, AC004460, AC005274, AL031846, AC005245, AC007461, AC005730, AL109984, AF024533, AC005030, AL035071, AC004805, AC006596, AC005694, AL022316, Z82246, AL121825, AC002369, AJ229043, AL021920, AC005233, AC005874, AF134471, AC002456, AC004765, AB022430, AC005320, AC007055, AC006515, AC004645, AL022326, AC002565, AB020863, AC006065, AC004775, Z98946, AC006057, AC006142, AC005088, Z69648, AC005284, AC005837, AL079340, AC007666, and U89337.
HUKAA54	1730	503630	1 - 441	15 - 455		AA303097, AL022325, and AL031588.
HUKAA39	1731	503627	1 - 318	15 - 332		R58995, AW444583, AI139054, AA303128, AI422562, AW452316, AW136820, AI355998, AI871425, AI499766, and AC005789.
HUDBZ01	1732	869026	1 - 519	15 - 533		AC000070.
HUDBK39	1733	886368	1 - 474	15 - 488		N88782, N88601, AA247964, N84855, H58760, N83168, AA095359, N89520, N83991, AA096046, AA247827, N83992, N55698, N84048, AA095641, AA096066, N88518, N84718, N86694, N83993, N84712, AA471338, N84830, N87989, N84829, S78798, U48696, AF103726, AR066487, AF039698, AF045432, AF102850, AF032922, AJ243486, and U390066.
HUDBE95	1734	795796	1 - 316	15 - 330		
HUDBE64	1735	746508	1 - 348	15 - 362		
HUDBE48	1736	869034	1 - 423	15 - 437		AI651392, AI912649, AI690582, AA101690, H02616, AI139898, AA731894, AW269260, AW248051, C04885, AW137058, AI597917, R41929, AI01381, AI125561, AA394302, AI884475, AI913287, AI915152, AI753690, AA295249, AW088536, AI380436, AI632150, and AB020861.
HUDBE28	1737	686520	1 - 360	15 - 374		AI697533, AW204092, and AI963731.
HUDBE02	1738	917361	1 - 123	15 - 137		AA585476, T18597, R28735, R29445, R45895, R28967, AA170832, R29218, AA585325, N86592, R28895, AA283326, R28965, R28892, R29179, AA585098, R29657, R29177, C16293, AA585101, D61254, C16315, Z28355, AI546875, AI557734, AI557864, AI525306, D53472, C16300, D57491, D60844, R29262, R29172, Z32822, D60765, AI526140, AI546971, AI541365, AI557763, D59751, AI546999, AI547250, AA585439, AI557262, C15406, D53447, D54897, C15120, D53161, D52835, AI541383, AI541374, AI541356, D59436, D61185, C16292, AI557740, AA585155, D55233, Z32887, AI526184, AI546945, AI525500, AI525431, AI546921, C16305, C15069, D57186, AI541517, AI547006, C16294, C15762, AI540967, AA092643, C16290, T19407, AI526194, AI541205, AI541535, Z30131, AI526078, AI525316, AI541013, C15737, AI557731, AI526073, D60730, AI541523, AI557787, AA585356, AI546996, AI547039, AI526191, AI541307, AI525556, AI557758, C16296, AI557727, AI546891, T41289, C14208, AI526016, AI541346, AA174170, AI541527, AI525320, AA514191, AI557807, AI525339, C14723, C14322, C14391, T41329, AI547202, AI557264, AI557155, AI547196, AI557084,

					AA585117, AI525286, AI557799, AI557408, AI547137, AI526113, AI557718, AI540920, AI541034, AI557809, AI526180, AI536138, AI526158, AI535639, AI526109, AI526024, AA585430, AI556967, AI557602, AI524890, AI541514, AI535660, AI540974, AA585453, AI557808, AI540903, AI546828, AI541390, AI541321, AI541506, AI541415, AI546829, Z33559, N87188, AI557279, AI526112, AI525332, AI541508, D54850, AI540882, AI546954, AI547189, AI526195, AI557796, AI541345, AI557039, N88113, AI657485, AI541422, AI546831, N88337, AI524904, D59458, AI557533, AI541515, AI541017, AI526117, AI546901, AI525656, N85682, AI557786, AI557802, N88532, AI557852, AI541027, AI557238, AI547071, AI540944, AI557285, AA585434, AI541410, AI525114, AI046024, D61060, AI547026, AI541492, AI048523, AI557041, AI557082, AI525168, AI557317, AI557810, AI525076, AJ243486, D50010, D13509, AR062872, AR062873, AR038855, AR062871, A25909, A20702, A20700, AF082186, Y09813, AJ244005, Y16359, AR054723, Z32836, AR038762, AJ244004, X81969, D78345, A43189, A43188, AR017907, AJ244003, X55486, AR018815, AC005913, A98420, A98423, A98432, A98436, A98417, A98427, AF045432, X82786, A98767, A93963, A93964, I63120, AJ244006, X76012, U39066, AR003381, U48697, and U48696.
HUDAK54	1739	899753	1 - 822	15 - 836	AA247964, N88601, N89520, N88782, N84718, H58760, N84855, N83992, N83168, N83991, AA095359, AA247827, N84048, AA093224, AA096046, AA095641, AA096066, N83993, N86694, N84712, AA471338, N55698, N84830, N88518, N84829, AF154415, AF164678, AF165161, S78798, AF045432, AF103726, U48696, AF102850, AF039698, AR066487, AF032922, AJ243486, and U39066.
HUDAK19	1740	671974	1 - 444	15 - 458	H16933, AA149496, and AA531296.
HTTKG12	1741	969547	1 - 461	15 - 475	AA172361, AI537800, AI791659, AW272815, AI355103, F23338, F34506, AI934307, AI246996, AI242614, AW407220, AL045476, H51835, AI869797, AA503258, AW238341, AI805261, F23327, AI587583, AI587565, AI720141, AI471455, AA808725, AI865980, AW151761, AA342238, AI246192, AA524800, AI927275, AW265688, AI281474, AL046416, AI687343, AW270619, AW023111, AW372037, R34070, AI310464, AI521525, C14014, AI539024, AA743811, AW069227, AA657835, AI801563, AA484892, AA947369, AA992877, AI249688, T71936, AA468923, AW020150, AI537368, N71619, H79308, AI280266, AA364082, AA218684, AA533463, AI251436, AA084320, AW302017, AA351840, AA610433, AA936718, AI858165, AA350644, AA904275, AA714011, AA298365, AW272389, AI445216, H59856, AW275719, AA719433, AA720582, AW104163, T07451, AL118980, AI880889, AA583386, AA550959, AA292254, AA018923, AI935827, AW419389, AA846923, R73744, AA128592, AL134441, AA714110, R56485, AA809104, AI821945, AI587349, AW439703, AI536625, AA533054, AI223968, AI568659, AA992126, F32248, AW274078, T39390, AI205181, AA630122, AI367473, T48723, AI024339, AA774794, AA632765, AC006511, AC005740, AC002059, U47924, AC002985, AL031985, AC006538, AC005102, AF196779, AL031281,

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HTTKC85	1742	956206	1 - 436	15 - 450	AI224604, AA279200, AA258999, and W37285.
HTTJV79	1743	869602	1 - 434	15 - 448	AA825972.
HTTJN26	1744	869612	1 - 891	15 - 905	AI356567, N90525, AA232991, AI148171, AI022165, AA233101, AA573721, AA448133, AI306380, AA447991, AA127550, AA127551, AW016855, AA243852, AI473237, AI005068, AA554071, AA570256, AA906902, AW014761, and AI359627.
HTTJK06	1745	934094	1 - 564	15 - 578	AA853292, AL117470, and AB023143.
HTTIX05	1746	931024	1 - 520	15 - 534	AI493098, AW024745, AA921917, W90789, and AI915946.

HTTIR33	1747	974323	1 - 341	15 - 355	AC004491, AL050307, AP000023, AC004884, AL078472, AL008715, AC007227, AC005180, and Z98304.
HTTIR04	1748	926772	1 - 557	15 - 571	AA083298, AA829975, and AB014535.
HTTIN11	1749	965920	1 - 801	15 - 815	AL133824, H86873, and H86809.
HTTIE08	1750	958169	1 - 427	15 - 441	AW052126, and AA101833.
HTTIB12	1751	969568	1 - 336	15 - 350	R92571.
HTTHJ56	1752	944914	1 - 258	15 - 272	D81882, AA193637, AA234876, T83136, H11688, AA258658, AA306506, and AA252212.
HTTTFG12	1753	751809	1 - 359	15 - 373	AA169457, AA172190, and A1636076.
HTTEZ61	1754	742004	1 - 539	15 - 553	R13891, AI150008, and AI198021.
HTTEQ59	1755	739445	1 - 550	15 - 564	AA237056, AA491051, H78425, and R92491.
HTTEQ01	1756	917156	1 - 458	15 - 472	AI827837, AI142441, AI086379, AA813388, AA253028, H17296, AA613757, AI474835, and Z83845.
HTTEO59	1757	900662	1 - 148	15 - 162	
HTTEO53	1758	728344	1 - 763	15 - 777	W74401, Z45510, H79976, D81436, D53762, and D61200.
HTTEJ56	1759	573669	1 - 492	15 - 506	R54109, AI884701, Z39259, R41821, and AW075808.
HTTEB05	1760	932294	1 - 373	15 - 387	C74999, T90424, AB023197, and AL031672.
HTTDO59	1761	744438	1 - 734	15 - 748	R82651, R82700, AA372368, N79122, AA033606, AI546974, AL133016, AL122061, AB021868, AF034080, and AF032872.
HTTDM42	1762	460948	1 - 389	15 - 403	R95162, and H91087.
HTTDL81	1763	694222	1 - 392	15 - 406	AA485538, H74053, N43924, N43932, AA280231, AA613434, and AL022328.
HTTDL75	1764	766551	1 - 356	15 - 370	AA199666, AL120288, and H18766.
HTTDA85	1765	784537	1 - 408	15 - 422	N46977.
HTTCQ95	1766	796674	1 - 310	15 - 324	N57049, and AW078548.
HTTCJ39	1767	709581	1 - 469	15 - 483	AA012877, AA021074, AC007450, AC009533, and AC008013.
HTTCD06	1768	960599	1 - 483	15 - 497	R22892, R30952, AA767622, D80460, D60956, AI800613, D60394, AI750009, AI453046, CI5178, R81201, and DS9944.
HTTCB87	1769	524841	1 - 224	15 - 238	H80337, AA769820, R16729, AI091785, and AW273500.
HTTBR42	1770	714220	1 - 329	15 - 343	AA164855.
HTTBP62	1771	932997	1 - 601	15 - 615	AA341024, and AA249649.
HTTBO82	1772	780164	1 - 422	15 - 436	N59547.
HTTBM03	1773	925409	1 - 193	15 - 207	R96101, and AL050318.
HTTB180	1774	781590	1 - 229	15 - 243	AA256038, and AA768241.
HTTBH95	1775	530559	1 - 244	15 - 258	
HTTBH75	1776	767520	1 - 422	15 - 436	R21404, AC006987, and AF146191.
HTTBH36	1777	530567	1 - 299	15 - 313	

HITTAQ60	1778	742377	1 - 615	15 - 629	H73605, R92625, AA300822, and T77356.
HITAP45	1779	717736	1 - 384	15 - 398	AA300727.
HITAP21	1780	671488	1 - 802	15 - 816	W94307, W79130, AA300911, AL023803, and AF086439.
HITAP09	1781	826343	1 - 427	15 - 441	AA189122, and AA300969.
HITTAN34	1782	509454	1 - 455	15 - 469	AA522276, AA227154, A1656990, AA301077, AA301076, AL042627, AC004593, AL023574, and AC007536.
HITTAJ93	1783	791413	1 - 406	15 - 420	R01464, AA300985, T87497, and Z75742.
HITTAH03	1784	965134	1 - 282	15 - 296	A1198425, A1480040, AW054766, A1564875, A1359129, A1359233, A1422375, A1651642, A1056060, AA301255, T82079, T84917, T85537, T86503, A1954689, A1962153, T92050, A1742287, AA421072, A1244008, AA379174, A135598, H84990, AA045378, H86604, A1580336, AA731146, R99375, H86921, AA007586, A128609, AA062583, T85467, AA453722, H55168, A1200967, AA383353, T10083, and AA919169.
HTTAC77	1785	772735	1 - 764	15 - 778	A1694695, AA913353, AW236100, AA846529, AW301152, N62629, A1366198, AA449338, AA694442, A1620459, W39523, A1521787, AA977228, AA600876, AA724335, AW078557, AA995242, AA860876, AW235851, W15410, AA456019, AA301436, AL122078, and AF198358.
HTTAA94	1786	793001	1 - 555	15 - 569	AA191546, W91892, AA486427, AA694339, AA416561, A1140707, AA417297, H77647, H77648, W95110, AA303182, T19870, H26488, and AL031255.
HTTAA39	1787	710355	1 - 284	15 - 298	A1800489, AW105035, A1480088, AW299975, AA303221, A1670831, and AA135748.
HTLIP06	1788	934207	1 - 330	15 - 344	A1820928, AA405805, A1821678, AA813084, AA410617, A1821566, AA235536, AW302988, A1344933, A1344928, AW161579, AW268220, A1610756, A1537677, AA225339, AL036361, A1251221, AW103371, A1498579, A1683340, A1610645, AL041772, AW150578, AL038445, A1860537, AL036736, A1554245, AL119791, AL036403, A1815855, AA572758, A1627988, A1336592, AL039086, A1340603, A1866002, AL079963, A1950664, A1349004, AW074869, A1633419, A1312428, A1859464, A1521012, A1251205, A1308032, A1344785, A1783504, A1284517, A1434281, AW081255, A1922901, A1888944, A1308035, AW023590, A1345347, AW129106, AL119748, AL038605, AW117882, AA427700, AL036274, AL040241, A1349933, A1800453, A1800433, AW059837, AW238730, A1433976, A1636719, AW169653, AW268251, AL042628, A1923768, AL121365, A1491852, A1572418, A1252023, AL119863, A1923989, AL042551, A1318280, AA508692, A1828731, A1564719, AW190042, A1281772, A1889376, A1681985, A1524671, A1345608, AW268768, AW051258, AW117746, A1921248, A1611738, A1590120, A1829327, A1619502, A1677796, A1306613, A1632408, A1802542, AL043981, A1497733, AA658033, A1499285, AW088134, A1886753, A1174394, A1933589, AW026882, A1539153, A1269696, AL045266, A1620284, A1340582, AW002342, A1468872, AA640779, A1868831, A1539028, AW020693, A1334450, AA613907, A1335209, A1698401, A1445165, A1670009, A1862144, A1433157, A1702073, AL036802, A1873644, AW068845, A1648684,

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 AL119049, AW103893, AI561299, AI476109, AI608676, AI446373, AI446003, AI922676,
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 AL120853, AI224992, AI554218, AL042627, AI963216, AW301409, AW082594, AI571909,
 AI521560, AW149227, AI282326, AI343059, AW079159, AL036631, AI619716, AI284131,
 AL042544, AI312152, AI687065, AI612759, AW268072, AW089179, AI554425, AI926790,
 AI801325, AI500523, AI867042, AI696819, AA493647, AW075084, AI932794, AI280661,
 AI349937, AI699011, AW300889, AI349645, AI680498, AI537617, AI919345, AW088903,
 AI364788, AI500706, AI348897, AI307708, AI500662, AI251830, AI569583, AI866573,
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 AW081797, AW080402, AL049314, I48978, I48979, AF113694, A08916, I89947, A08913,
 A08910, AL122121, AL122110, AJ242859, AL122098, U80742, AL050108, X65873, A08909,
 I89931, I49625, AL110197, AF113676, AL122093, S78214, AB019565, U72620, AF125948,
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 X84990, AL133560, AF177401, AF106862, AR011880, AF118064, AL137557, AL122050,
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HTLID06	1789	974047	1 - 648	15 - 662		AW238325, AA513916, AW169687, AI344844, AA371311, AI357551, D53046, AI880168, AW270284, AA554293, AA526514, AA371410, AI884861, D55004, D51877, AA317144, AI298977, D54301, D51997, D55588, AA384911, D51927, D56450, AI885465, R81453, AA365548, AW438916, AA364488, F13749, AI345654, AL135643, AI751162, AW162288, AI696793, AI565581, AA714140, R66997, AW128881, AI590404, AA586433, AW102955, AI914558, AA304790, H38817, AA295893, AA295899, AL040462, T06292, H41462, AA493829, AI214510, R48980, AW327597, AI359368, AI869786, AA572967, AW090629, AW327555, AL137946, AL137954, AW175641, AA583978, H21488, AI907629, AA373861, AW151727, AA658235, AA247731, N43757, AI630283, AI557323, AA435854, AA745560, AI761471, AA745431, AI053672, AA450199, AI801600, AA665293, AI345522, AA655002, R63239, AI921649, AI334443, AI859742, AW081359, AI376100, AI345459, AI336660, AA192740, AA178953, AI340453, AL043756, AW074059, AI064952, AI356904, AI922654, AI564284, Z96530, Z98884, AC004814, AC000114, AL135960, AI131016, AC007450, AC004382, AC007878, AC005034, AC006398, AE000658, AL031643, AL008627, AC006210, AC005370, AL031430, AC005386, AL021808, AC006965, AC006952, AC005822, AC004671, AC008134, AC004593, Z99570, Z84487, AC007970, AL034370, AC004074, AC000027, AC006548, AC004659, D87014, AC004552, AC003101, AC006213, AF011889, AC004616, AL132777, AC012331, AC006030, AL078593, AL008708, AJ011930, AL133353, AL079305, AP000959, AL078476, AC004222, AC006544, and AL049829.
HTLHV59	1790	965808	1 - 530	15 - 544		AA036821, AA877774, AA845452, AA902976, AW027037, AW245073, AI857490, AA948226, AA977183, AI819768, AW085596, AA363071, AA528041, AI804187, AW376089, AI763409, AI524117, AA622713, AW090272, AA973857, AI361156, AA515276, AI686841, AA971889, AI953946, AA595152, AI209096, AI474502, AA918802, AA581475, AI888756, AI129507, AA371872, AW304826, AA632326, AI274834, AI799750, AI206384, AI290279, AI590567, AI340981, AI683971, AI802753, AA352552, AI739258, AA524697, AA417825, AI147766, AA018444, R49435, AW167804, AI281446, AW008926, AI570321, AI143414, AA648251, AA768690, AI468510, T91019, and T34395.
HTLHU81	1791	870150	1 - 863	15 - 877		AA488434, N76166, AA085536, AW390492, AA488573, AA375937, N39974, AA401426,

				AA307647, W05791, N64758, A1148945, C17327, C16676, C17892, A1200786, A1148951, T11417, D80258, C14227, D59503, D81111, D58246, A1535686, C06015, D80014, D80064, D80247, AA809122, C14389, D58101, D80195, AA514184, D80043, D59467, D80391, D59787, D80164, D59502, D58283, D51423, D80022, D81026, C14407, D80196, A1557774, C03092, D80168, D80227, C14014, AA305578, D57483, D59275, D80038, D80251, D80188, D50979, D80157, C15076, D80253, D80269, D80439, F13647, D80302, A1557751, D80166, D51103, D80193, D59619, D80210, D80240, D80045, D59859, C14331, AA305409, D80133, D51799, D50995, D80366, D81030, D60214, D80024, D59627, D59889, D80522, D80212, D80219, AW178893, D59610, D80268, AA400102, D51060, D51022, D80248, AA514188, H67866, D59927, H67854, AA514186, D51759, D80378, C14344, T03116, D59317, C14298, D45260, D80241, AW177440, D59653, D59551, D51221, AW360834, C14973, A1525242, A1525227, D59474, C14429, A1525917, AW360817, C14957, D60010, D59695, A1525923, D51213, A1525920, AW377671, AW375405, D45273, D52291, AW360811, C05695, C75259, T03048, Z21582, AW178907, D59373, AW178908, D51079, A1525235, AW352117, Z33452, C14046, C16955, A1525925, D80949, A1525237, A1525215, AW178906, AW360844, AA285331, A1535959, T03269, AW179328, T48593, AW375406, AW378534, AW179332, AW360841, AW377672, AW179023, AW178905, AW366296, AW177731, AW378528, AW178762, AW179019, AW378533, AW378532, A1525912, AW377676, AW352120, AW378539, AW178914, D80228, AW378542, AW367950, AW360855, AW176467, C05763, T02974, AW178909, AW179020, AW177505, AW352171, AW352170, AW178774, AW177733, AW179024, C13958, AW179018, T02868, AW178781, D51053, D51250, AW378543, AW378525, AW352163, C04682, AW177456, AW178911, AW378540, AW177734, A1525222, AW178775, AW179004, AW179329, AW178980, D31458, AW177728, AW178986, A1525928, AW178754, AW369651, Z30160, AW352158, C14077, N66429, H67858, A1910186, A1525928, AW177508, AR018138, AB002449, A82595, AR060385, AB028859, A1321110, A84916, I14842, A62300, A62298, AR008278, AF058696, AR054175, I50126, I50132, I50128, I50133, AR008277, AR008281, AR016808, AR062872, X64588, AR016514, X67155, Y17187, A70867, AR060138, A45456, Y17188, A94995, D26022, A26615, AR052274, A43192, Y12724, A63261, A43190, AR038669, A25909, I79511, AF123263, A64136, A68321, AR066488, Y09669, AR066487, A67220, D89785, A78862, D34614, A30438, AR008443, X68127, I82448, AR016691, AR016690, U46128, AR032065, D50010, D88547, X72378, A63887, AR008408, Z82022, and AR060133.	
HTLHU63	1792	870147	1 - 515	15 - 529	RS1662, H17203, R13772, R17328, and AFI76701.
HTLHS69	1793	870152	1 - 659	15 - 673	AW166505, A1085633, A1830616, A1948664, A1817701, AW183365, AW082276, A1471025, AA843215, W31421, AW439937, AA843291, A1476729, AA781027, and W04559.
HTLHS05	1794	933720	1 - 712	15 - 726	A1348086, A1928156, A1074858, AW136076, AW243178, A1262696, AA627913, A1810972,

HTLHK57	1795	894863	1 - 1127	15 - 1141	AA595104, AI858055, AW043820, AI582191, AW001777, AI804955, AI798900, AI242330, AI887909, AW001248, AI813670, AW028151, AI336325, AW243042, AI299745, AI805058, AI923922, AI949719, AI741492, AI304384, M62028, AI276119, AI269740, AI684429, AI183994, AI401041, AI580934, AI097473, AA321296, AA480684, AI200633, AI719036, N42455, AA480650, W68465, AI348656, AA365138, AA335996, AW263563, T48387, AI648474, N66329, AA527274, AA863058, AA642939, AI277482, AI971175, AA884197, AI347141, AI863828, AA367149, AI474817, W68353, W25028, AI262960, AI054319, AI700621, H27099, AW205513, AA987972, AI015046, Z39325, W46985, R60687, T66319, F04561, AI656572, AI026748, F09789, F01927, F04682, AI521950, AI498629, H12192, AI214318, AI580497, H11935, AA136297, T15701, AI161214, AI890045, AI948515, AI866509, AI423812, T07980, and AB021226.
HTLHJ51	1796	865399	1 - 1017	15 - 1031	AA504779, AA491394, AA699349, AA004906, AA778225, AA005001, and AA806914, AA18490, AA418620, AI922829, AI264627, AW002386, AI080674, R61294, AI424861, AI610381, AI263843, AA004548, AW075751, AW080659, AI275462, AA570113, AW271292, W60463, AA453156, AA599740, H09296, H23133, AI473729, AA454079, AA054336, T35266, T35000, AI554231, AW078913, AA502766, AW151599, Z45311, Z38523, N84063, T66912, T31030, R44925, AA363400, R49157, AI521799, AI348847, AI344931, AL038456, AI628833, AW196097, AI345114, AI307494, AI345677, AI340627, AI349622, AI310606, AI345370, AI307446, AI828705, AI312271, AI824648, AI349814, AW081242, AI561087, AI862144, AI312261, AI345224, AI340644, AI311892, AI345026, AI952217, AI582871, AW082033, AW268261, AI553669, AW074869, AI491904, AI241678, AI307210, AI336513, AI336662, AI307569, AI345253, AI344935, AI348895, AI345736, AI313320, AI343091, AI310575, AI336495, AI310920, AI313352, AI307503, AI307736, AI335235, AW029349, AI336585, AI349266, AI334452, AI349787, AI340533, AI344938, AL036215, AI312146, AI590423, AI309431, AI312339, AI340537, AI345258, AI348854, AW148590, AI345471, AI307459, AI334895, AI636595, AI307507, AI348879, AI349245, AI311604, AI349805, AI343131, AI310930, AI349269, AI312333, AW168503, AI310945, AI312431, AI439089, AL038775, AW071380, AI573085, AW020381, AI335363, AI742068, AI311159, AI620093, AI348897, AI345397, AW054972, AI334930, AI307520, AI887775, AI340664, AI307542, AW132104, AA848053, AI349637, AI866465, AI334902, N75771, AW150804, AI336488, AI336565, AI311440, AI345737, AI345396, AI874109, AI922756, AI860694, AI349971, AW268253, AL047422, AI348969, N71180, AI567971, AI366959, AI358042, AI343140, AI366992, AW059828, AI349276, AI539690, AI345315, AA468418, AW274192, AI349645, AI345735, AI349246, AI242736, AI307708, AI865116, AI335476, F31233, F36033, AI345745, AI340659, AW071377, AI050666, AI345005, AI633061, AA427700, AI309443, AI343030, AI619754, AI690930, AW058233, AW021373, AL040694, AI271234, AI623736, AI349186, AI349279,

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HTLHB93	1797	945862	1 - 361	15 - 375	AI828062, AI028564, AW173227, AW102657, and AL035460.
HTLHA63	1798	870172	1 - 554	15 - 568	AI218545.
HTLGS10	1799	963458	1 - 470	15 - 484	AI560769, AI857497, AW151454, AW298036, AW007781, AW166326, and AW339468.
HTLGR32	1800	928245	1 - 943	15 - 957	AI126041, AA812952, AA770544, N26185, AI222967, AA813689, AA815395, AW119183, and AA912724.

HTLGP84	1801	782194	1 - 534	15 - 548	AA709009, AI570570, AA708887, AA062549, AI871015, AA757855, R41916, H80820, AA719341, AA701030, H30641, AA063144, AA757876, AA063046, R87769, H79988, AI003643, AW138067, R12796, and AA758374.
HTLGK08	1802	958304	1 - 463	15 - 477	AA813640, AI766152, and AW403165.
HTLGC43	1803	870228	1 - 484	15 - 498	AI653373, AI917476, AI650958, AI684722, AI632004, AI962304, AI341785, AW195932, AI653363, AI672453, AA778499, AA613494, AW197798, AI968944, AW001758, AA813413, and AA279933.
HTLEQ92	1804	932882	1 - 296	15 - 310	AI962454, AI432386, AI087321, T08978, T77035, R12108, AI093960, R51395, AW196322, and AL117444.
HTLEP21	1805	671151	1 - 402	15 - 416	AA737807, AW296355, AI694694, AI950417, AA448944, AI341643, AW083848, AA316241, AW076055, AI341859, AI950236, AW452665, AI796355, AI338467, AI367080, AF081280, AF079325, and U67172.
HTLEN77	1806	772363	1 - 410	15 - 424	T89583.
HTLEM92	1807	573400	1 - 419	15 - 433	AC005695, AR049867, and U75586.
HTLEL16	1808	384492	1 - 425	15 - 439	R21318.
HTLEG67	1809	751842	1 - 305	15 - 319	AI149770, AI809937, AA644408, AI808767, AI913293, R06443, and R06497.
HTLDZ81	1810	778180	1 - 351	15 - 365	
HTLDW27	1811	961353	1 - 587	15 - 601	AI479021, AW339781, AW276999, AI369304, AW392460, AI391729, AW392463, AW392466, AW392459, AW392461, AW392468, AW392462, AW372446, AI903603, AB028990, AF014461, and AF032667.
HTLDO01	1812	913669	1 - 703	15 - 717	AI198827, AA397596, AA435832, AC002056, and AC000036.
HTLDG43	1813	715439	1 - 123	15 - 137	
HTLDB18	1814	868533	1 - 436	15 - 450	R18251, and C06467.
HTLCZ79	1815	572853	1 - 273	15 - 287	
HTLCX66	1816	578921	1 - 318	15 - 332	
HTLCO02	1817	921045	1 - 429	15 - 443	AI360679, and AI217856.
HTLCG65	1818	413333	1 - 129	15 - 143	AA420979, and AC006060.
HTLCG59	1819	530039	1 - 205	15 - 219	AB007918, and AF202893.
HTLCA03	1820	870290	1 - 236	15 - 250	
HTLBH67	1821	751985	1 - 432	15 - 446	W19592, and AC005368.
HTLBC07	1822	954111	1 - 662	15 - 676	AA626715, AA403001, and AW003923.
HTLBB72	1823	766270	1 - 711	15 - 725	AW401867, H88137, W19173, AW390017, AI088172, AI970225, AW134697, AW390006, AI971802, AA991241, AA906307, AI808864, AA781530, AI918830, AA742991, AA936350, AI478204, AI523622, AA808091, and AA923464.
HTLAI30	1824	690936	1 - 562	15 - 576	R40037, R60927, AW005925, Z41798, and F01644.

HTLAF33	1825	870300	1 - 432	15 - 446	T27009, Y18503, and Y18504.
HTLAC61	1826	683247	1 - 153	15 - 167	AA323644, T94592, AA298192, N55287, AW162762, AA525407, AA167549, A1459879, N99245, AA522864, AA579082, F00937, W69639, AA132445, F04838, AL133906, AL133902, AA745302, AA297698, AI253376, AA457230, AL046416, N22837, AA568390, N35492, AI207476, AA657910, AI354233, AA523833, AA584756, T73021, AA155817, AA365056, AA363890, AL047480, H87756, AA831997, AA368329, R99076, AI636734, AA338216, AA847427, AW028179, AA357979, AI653783, AW057873, AA809179, AL138091, N34258, AW245354, AI073735, AA847508, AA553830, W52705, AA653291, AA629852, AA632765, F34605, R93224, AI471467, AA668711, AA302763, AA467740, AA654293, AI471455, AA468135, AI734119, AA352521, AI732720, H43183, AI475294, AI687343, AA368201, AW392414, AA133013, AI733856, AC005914, AP000501, AC002111, AC004862, AL132987, AC005547, Z74617, AP000359, Z92845, AL031985, AC005332, AC011456, AC006992, AC007225, AC005412, AL009174, AC005399, AC002375, AC002299, AC000070, AC006197, U52111, AL050337, AC009946, AL022721, AB023049, U24498, AC005300, AL031283, U95740, L39891, AL022163, AL035541, Z86090, AC004531, Z99716, AC004673, AL035534, AC006512, AL035089, U47924, AL078581, AP000141, AL035413, AP000088, AL035405, AC002470, D87675, AC002565, AP000344, AL034420, Z98044, AF111168, AC005821, AL031293, AC005235, AC005670, AC002425, AC006130, AC005796, AC009516, AC005058, AP000556, AP000557, AL049692, AL033504, AC005379, AL133382, AC002077, AL031295, AC004587, AP000495, AC002483, AC005702, AC006101, AC007388, AL133371, AC007151, AC005057, AC000035, AC007731, AL022313, Z98941, X64467, Z83838, AC004148, AL022238, AL049869, AL035072, AC005998, AL022326, AL121748, AC002302, AL035587, AP000065, AL049814, AC002472, AC003043, AC006023, AL136295, AD000092, D63861, AL030996, AL033381, AC006116, AC004098, AC005014, AP000343, AL022322, AP000114, AP000046, AC004242, Z97053, AC005899, AL049569, AC004893, AC006146, AL022316, AC003086, AL109801, AC004816, AL049553, AC004383, AC004813, U72790, AC000025, AC005089, AL050319, AL031662, AC006543, AL031587, AC007387, AC006544, AC000085, AC002326, AC005527, AC004079, AC005500, AL109963, AP000493, AC004882, AC007216, AC004858, AC003687, AL122023, AC004491, AF109907, AC004883, AL137549, AF020662, AC004790, AC005265, AL049653, Z98750, AL023575, AC007868, AC006141, AC004466, Z81365, AC008115, AC006210, AC005669, AL049570, AP000513, AP000353, AC009263, AP000550, AC002314, AL133163, AC006080, AC004985, AC004841, AC006486, AR036572, U91328, AL021878, AC002511, AC005272, AL034344, AC005826, AC006379, AC005800, AC008018, AL031007, AP000352, AC004849, AC006449, AL080243, Z93244, U80017, AC006538, AC006011, AC004106, AC005529, AC005160, AC007565, AC003972, AC004792,
HTLAC39	1827	575343	1 - 214	15 - 228	

HTLAB55	1828	732480	1 - 451			AC007546, AC005182, AC007746, AL031984, AC005005, AC009247, AF196779, AC008078, AC006312, AC009731, U82828, Z83836, AC005324, AL031729, Z99129, AC003108, Z93017, AF047825, U07000, AC005066, and AC005839.
HTLAB29	1829	879168	1 - 432		15 - 465	T65363, and F11993.
HTFBE02	1830	920507	1 - 571		15 - 446	AA023022, H51019, A1309636, A1569285, A1431902, R90861, A1740858, and R23430.
					15 - 585	R92414, AA197116, F00607, A1923217, A1814569, A1804663, A1762903, A1804682, A1143304, A1082030, A1139520, A1911904, AW274978, AW450838, A1216343, A1183410, AA680119, W93273, R92413, W93272, A1918971, T51116, A1823928, C15320, R42713, T51024, T96094, A1422647, A1216344, T96093, A1936703, A1869077, F00114, A1741425, C00216, Z66165, and Z56024.
HTEQS95	1831	972746	1 - 654		15 - 668	
HTEQS90	1832	973426	1 - 667		15 - 681	
HTEQP03	1833	870516	1 - 584		15 - 598	A1652668, AW196588, A1611041, and A1696211.
HTEQN83	1834	908528	1 - 331		15 - 345	AA442506, AA436703, AA080897, AA219287, AA214213, AA332559, AA356572, AW197626, W86428, AA083980, AW239273, AL042822, AW137277, AW197400, AW197285, AA772083, AW206752, AA854258, A1934409, AL096747, AB021642, AB021644, and AB033024.
HTEQB08	1835	958291	1 - 711		15 - 725	A1144505, T83402, AW439340, and T81586.
HTEPY28	1836	870559	1 - 682		15 - 696	AA412612, AA412499, AA719038, and A1149873.
HTEPV63	1837	870549	1 - 917		15 - 931	A1217359, AA229749, A1990822, T80962, A1393339, AA935552, AC005844, and AC006205.
HTEPE35	1838	948475	1 - 825		15 - 839	A1935040, AA861064, AA933697, AA707583, AA872105, AA398866, AA609626, AA620685, AA435866, AA812556, AA781805, AA993718, AF012362, A1217888, and AA824315.
HTEOY82	1839	948845	1 - 489		15 - 503	AA724785, AW341727, A1990635, AW138616, and A1010949.
HTEOO83	1840	836721	1 - 720		15 - 734	AA885943, A1807908, A1214900, A1810745, AA725810, F31353, and H91431.
HTEOE28	1841	870581	1 - 846		15 - 860	A1222323, AW274395, AW104230, and AA917623.
HTENY44	1842	870588	1 - 320		15 - 334	AA860344, AW449340, A1188119, AW241563, A1218844, AA725683, AA860397, H48932, AA398488, AA416572, A1654971, AA719259, A1797656, A1337070, AA416676, H52862, AA402604, and AL137366.
HTENV06	1843	933294	1 - 479		15 - 493	N41901.
HTENS74	1844	773925	1 - 544		15 - 558	N41653, A1879320, A1879319, AW249274, A1928959, N33827, AA701980, AA156930, AA777363, AL047958, AL048281, H95107, W68434, A1015217, AA364327, W68552, AA909383, W32502, A1188322, AA906240, A1741757, AA021053, AA329553, R16958, AW401707, AA281392, H00750, AA032085, W25157, N88679, AA534002, A1142442, AA552483, T85967, T75519, W88713, H94009, A1985732, AW248852, A1362972, A1240796, A1929211, A1129518, W84587, W84606, A1708380, AA156806, AA954310, A1369295, AA745783, AW291743, A1096816, W88714, AA301938, A1167203, AA356672, F23466, AA666297, W60290, AA922513, W37200, W02166, W60381, AA090596, A1040943.

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HTENR26	1845	870595	1 - 292	15 - 306	AW374010, AI360575, AI018337, AW188121, and AC005879.
HTENQ92	1846	790908	1 - 639	15 - 653	AW188190, AI026684, AA861425, AI656213, AI656331, AI148424, AI597882, AA978263, AI806072, AI560944, AA609392, AW103266, W19795, AW341673, AA135775, AA131502, AI274049, AI559891, AA131402, AI797927, and AA135731.
HTENP08	1847	958382	1 - 433	15 - 447	AW293376, AW002918, AI206147, AW235254, and AI968897.
HTENL95	1848	795314	1 - 652	15 - 666	R95033, H98000, H15506, H54108, Z43087, and F07410.
HTENL73	1849	974363	1 - 705	15 - 719	AW368483, AC004671, AB015617, and AB029004.
HTENA08	1850	958380	1 - 193	15 - 207	AW118931, and AI205921.
HTEMY05	1851	880592	1 - 349	15 - 363	AA074939, X85715, and AA193675.
HTEMV66	1852	813038	1 - 456	15 - 470	AA430250.
HTEMU66	1853	944419	1 - 1078	15 - 1092	AL039924, AL045794, AW013814, AL036630, T02921, AL044412, T24119, AL044364, T24112, AW450335, AL039476, D51250, D80253, D80043, AL040992, AL039109, AL038531, AL037726, AL039629, AL039625, AL039648, AL038837, AL039074, AL039678, AL039108, AL039538, AL039564, AL039156, AL039659, AL039566, AL039509, AL039521, H00069, AL039128, AL044407, AL036973, AL045337, AL037051, AL045353, AL039386, AL039423, AL045341, AL042909, AL039410, D59787, AL039150, AL044530, AL038821, AL038025, D80219, AL036725, AL043422, D59275, AL043445, AL039459, AI535983, D80227, AL043586, AL043423, D80240, AL043441, D80210, D51423, T23947, AL036650, D80134, AL036196, D59619, D80391, AL037639, D80193, AW451070, AL037615, D80196, AL036767, C14227, AL039085, AI535783, D80949, AL036117, D80366, D59927, AL037526, AL042334, AW452756, D80168, R47228, AL036238, AL036679, AL037601, T11051, D81026, AL039504, C14014, D50995, C75259, AL039842, AL036964, D80045, AL036733, AL036158, AL037027, AL036924, AL037054, D59889, AL036765, T23659, AI557751, AL038851, T23658, AL037177, AL036998, D80022, AL037047, AL044413, AW293068, AL037643, AL036227, AL036418, AL036133, D80038, T11417, AL037082, AL036163, D58283, D80195, AL036207, AL037124, D81030, D80188, AL037021, AL036191, AL036167, AL036132, AL037049, AL037679, AL036190, AL037600, D51799, AL036139, D80378, F13647, D80522, T03269, AL036152, T23656, C14429, T48598, D50979, D80212, AL036900, Z21582, AL037178, AA514190.

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HTEMS01	1854	915308	1 - 576	15 - 590	AW182380, AI016150, AA436052, AI016144, AA459652, AI110776, AC007227, AC004536, and AL049761.
HTEMO58	1855	964769	1 - 475	15 - 489	AI026760, H54090, W90174, AI016127, and U22296.
HTEMN80	1856	775543	1 - 301	15 - 315	T80539, and AI719083.
HTEMM91	1857	938396	1 - 378	15 - 392	AI655972, AI809237, AI8722211, AI377032, AI381901, AA523409, AI150552, AI248517, AW328508, AA523391, AI241274, AA609120, W92335, AW194863, AA580479, AI912966, AW243314, Z25384, AI217725, AA531424, AI142666, AW137703, W56565, W56787, AI678791, F17380, R95131, AW057531, and AI825787.
HTEMI51	1858	870613	1 - 583	15 - 597	AI149866, and AA918162.
HTEMB57	1859	849214	1 - 456	15 - 470	AA398093.
HTELY90	1860	787549	1 - 356	15 - 370	AI022425, and T86122.
HTELV29	1861	806421	1 - 627	15 - 641	AA033981, AL043302, AL050276, AF194030, and AF185576.
HTELP07	1862	952274	1 - 550	15 - 564	AI005651, AA502325, and AI005304.
HTELM71	1863	954982	1 - 509	15 - 523	AA843728, AW303661, and AA813137.
HTELA02	1864	918699	1 - 602	15 - 616	AI651239, AW268856, AI024356, AI016924, AI016923, AI698585, AA609414, AA620951, AW072208, AI696034, and AI340253.
HTEKU62	1865	754010	1 - 713	15 - 727	R13043, AA402245, W03238, and AA293855.
HTEKI62	1866	812862	1 - 472	15 - 486	AA741257, W23913, AA769417, AI923864, AA099994, AA113016, AI633572, AI129921, AI740509, AI087861, AI198728, AA451698, AA811514, AW328432, AI345992, AW135872, AI865582, AA769447, AA716235, AA946657, AI818126, AA742292, AW025858, AI092084, AI864067, AI992065, AW027054, AI129952, AW105702, AA527064, AW166911, AI969997, AW263370, T12481, AI571406, AW243885, AA192190, AW134596, AI143876, AI143870, AW136628, AW009874, AI475650, AA063520, F21628, AA781441, F37014, AW074003, AI928446, AA736768, N91862, AA774271, AI611242, AW363815, F33207, AW328431, AI470616, H39778, W76151, W72588, AW444846, AW368798, AI479056, AI861919, AI223368, AI760686, AA973718, AA991724, AA804626, AW449436, AI217528, AI246328, AI391628, AA977169, AI222649, AI453599, AI825699, AI968087, AA910938, AW294100, N74597, AI587076, AI738417, AI818572, AI347378, and C00207.
HTEKH17	1867	942526	1 - 643	15 - 657	
HTEKD77	1868	772397	1 - 414	15 - 428	N47372, AA029276, AW173125, T51928, AW197647, AA436376, N56847, AI142573, AA885319, W26719, AI961121, R52187, AI032543, AW009278, T51718, AA992217, W37315, AI370687, AA495856, AI073556, AL041264, AF147339, and AP000533.
HTEJV94	1869	793039	1 - 381	15 - 395	AI628611, AA416585, AA420969, AW271467, AI831883, AI928360, AA421125, AW001638, AA397955, AI656005, AW016672, AW003460, AL110224, and AC003669.
HTEJO46	1870	717850	1 - 388	15 - 402	R72953.
HTEJN12	1871	653252	1 - 443	15 - 457	AA223373, AL096763, and Y18004.

HTEJL30	1872	696784	1 - 386	15 - 400	R92318, R97141, D61526, W58524, R13204, AA333107, AW163212, R55599, H23092, D52777, A929587, C05240, R19781, D61319, AA150352, Z46053, AA355121, AA296708, AA323111, D53669, R26633, H08329, AA317832, AA322876, W01316, AA973604, AA374431, R49663, AA296782, H23093, H85812, AA149563, AA318184, AI368381, AW088920, AI253781, R40292, AI928933, AI857794, AI452755, AI160425, AA975568, AA961868, AI171865, AA776210, AA025635, AA337795, AI191849, W73632, N79435, AA679726, AA865487, W78161, AW339133, AI582690, W58412, AI744177, AA902205, H97698, AI338657, AI338667, AW452422, AI187166, AA330474, AA333363, AA976009, AA126618, AJ239435, AI572582, AA085720, R55362, AA360533, AW166355, AI879369, AW163740, AI752339, AI302066, AI954021, AA355733, T57729, T60002, AA332269, AW160676, AW403792, AA111927, D61306, N31004, AA064830, W79204, D53612, AA961222, AA845309, AA186387, W07796, W73680, N58648, AA642523, AA151815, AI805801, T30103, D54012, T36033, AA393418, AF092135, and AI109701.
HTEJC70	1873	490772	1 - 587	15 - 601	R94482, and AI004651.
HTEJB07	1874	953801	1 - 451	15 - 465	AA939947, AW134645, AA884829, AI004532, AI150514, and AI239661.
HTEIS34	1875	887112	1 - 371	15 - 385	AI002739.
HTEIS25	1876	870660	1 - 390	15 - 404	AI208897, AI187424, AA682756, and AI187850.
HTEIN26	1877	684711	1 - 403	15 - 417	R72964, W76526, R64535, and U82396.
HTEIL36	1878	708304	1 - 425	15 - 439	AA417003, AA835058, AI424995, AI220270, AA694436, AW182313, R20520, AI382131, AI004786, AA418740, AA418795, AI190974, Z39070, AA742556, and AI809322.
HTEIJ58	1879	491030	1 - 528	15 - 542	N71729, N71226, AP000041, AP000109, and AP000285.
HTEID15	1880	395868	1 - 247	15 - 261	AA724539, and AA960890.
HTEIB38	1881	839966	1 - 318	15 - 332	
HTEIB37	1882	870671	1 - 336	15 - 350	
HTEIB03	1883	921926	1 - 223	15 - 237	
HTEIA57	1884	734983	1 - 489	15 - 503	N38963, and R92356.
HTEHX57	1885	734976	1 - 442	15 - 456	AW451115, AI863336, AW104507, AI692981, AI652017, AI827145, AI017283, AI955549, N33485, R76560, AW409808, AI207003, AI202422, and AI927281.
HTEHV11	1886	967439	1 - 561	15 - 575	AA916546, AI204535, and AI021331.
HTEHS17	1887	664436	1 - 391	15 - 405	AA424196, AA846387, AI797455, AA778547, AW340809, AI217364, AI188208, AI150580, AI123441, AI027637, AA770175, AI150190, AF012356, AA909271, AF012355, and AA442327.
HTEHJ11	1888	964956	1 - 242	15 - 256	C04728, AA381098, N45678, AA480568, W69682, AA397755, AA476511, AA476550, AI860245, AW024421, AW382036, AW382039, AA838817, AW382042, AW382037, AW381999, AW382041, AW381961, AW382000, AW381997, AA934010, AI363359, W69923, AW190584, N36268, W44317, AA181315, AI864889, AI130883, AI745226, AI934734,

HTEGW02	1889	920628	1 - 1006	15 - 1020	AA187057, W38774, AW382054, N26942, AI469219, AI380284, AI380273, W45689, AI057575, AA725447, AI360479, N48961, and AI057565.
HTEGU55	1890	931017	1 - 376	15 - 390	AI288698, AI914273, AI203577, AI696478, AA913934, AA812691, AI573252, AI936975, AI015501, AI280024, AW054753, AA975903, AI371833, AI160502, AA844728, AA687959, AA393300, F34643, AA813782, T53463, AI091343, AA435624, AA595143, T53462, AI364294, and AI217827.
HTEGS24	1891	932987	1 - 598	15 - 612	R61288, R05576, AA778664, AA280073, AB014581, and Z98752.
HTEGJ74	1892	765901	1 - 474	15 - 488	AA256743, AI374955, AI123527, AA251700, AA455406, AA429834, AA618437, Z28611, AI433315, AA331686, AI498096, AW203957, AI377211, AA770064, AA808245, AA828466, AA098810, AA331825, AA814045, AA101241, AI078061, AA625885, H53435, AA357747, and D42054.
HTEGJ56	1893	732630	1 - 607	15 - 621	R13795, and R14717.
HTEGJ38	1894	709420	1 - 356	15 - 370	N32789, AA992305, AI829630, AI453589, AI037906, AA490671, N47354, AF106857, and AF026169.
HTEGH60	1895	545137	1 - 207	15 - 221	W87922, and AA694342.
HTEGC30	1896	690998	1 - 463	15 - 477	AI125270, AI025275, AI017509, AA724721, AA970833, AA904629, and AC002128.
HTEFX90	1897	887616	1 - 568	15 - 582	N51343, AI341075, AI967945, AL035252, Z79996, AL031775, AL021978, AC002384, and AC002455.
HTEFU18	1898	666920	1 - 623	15 - 637	N41791, AI734225, W21309, AF026169, and AF106857.
HTEFO46	1899	719280	1 - 537	15 - 551	AA011636, AW136535, AA641738, AI242200, AA972854, AI357112, AI252660, AI919234, AI732405, and AW379801.
HTEFO28	1900	685383	1 - 470	15 - 484	AA188885, AA189066, AA834951, AA971947, AW389450, AA856992, and AA189065.
HTEEU78	1901	530196	1 - 327	15 - 341	N78395, and H45135.
HTEEU35	1902	707717	1 - 102	15 - 116	AL044999.
HTEEU27	1903	575476	1 - 275	15 - 289	AC004259, and AC004600.
HTEEU18	1904	530203	1 - 348	15 - 362	AA442512, AA002017, N68854, AF122013, AF064102, AF000367, and AF064103.
HTEEU17	1905	530200	1 - 371	15 - 385	
HTEET22	1906	675071	1 - 395	15 - 409	N53308, AI201311, and AA709195.
HTEEF25	1907	677513	1 - 329	15 - 343	AA461517, AL040379, AI825108, AL040378, AC007981, AC011718, AC008103, AC012330, AC007708, AC007324, AC009288, AC008079, AP000550, AC007325, AP000552, AC008018, and AC008132.
HTEEB82	1908	780161	1 - 326	15 - 340	H53320, R97852, AI032585, H53321, R97802, AL033531, and AL034424.
HTEDX39	1909	530201	1 - 246	15 - 260	AC005726.
HTEDX04	1910	927850	1 - 330	15 - 344	AF111169.

HTEDX03	1911	92533	1 - 190	15 - 204	AW002847, AC005300, and AC006946.
HTEDW96	1912	881958	1 - 539	15 - 553	AA101046, AA860334, AI240068, AI381744, AA064659, M79124, AB006626, AF132607, and A86973.
HTEDW59	1913	530448	1 - 201	15 - 215	AI139615, and AL117627.
HTEDV86	1914	785818	1 - 497	15 - 511	W87362.
HTEDU53	1915	727362	1 - 443	15 - 457	N75217, AI827641, and AI313263.
HTEDS40	1916	934047	1 - 496	15 - 510	N64316, and AA418089.
HTEDS06	1917	960645	1 - 839	15 - 853	AA557354, AA004230, AA702179, AI671185, AI924143, AI609113, AI056239, AI638795, AI337375, AA634413, AW250803, AA417152, AI135398, AA478510, AA195614, AA190630, AI814763, AA827285, AI091408, AI638180, AI080126, AA632206, AI379107, AI288872, AI263619, AA626405, AI679151, AI754325, AI769841, AI559213, AI679722, AA417030, AA552345, W93249, AA007263, AI969543, AA766364, AA534494, AI038181, AA960978, AA449336, AA573241, AW043937, AA725439, AI291838, N73539, AA189108, AI699813, N73585, AW104716, AW166044, D19671, AW192890, AA454518, AA621586, H73339, N54283, AA910989, H14801, H05808, N56013, H75580, AI038699, AA248270, AA149737, H70079, AA808510, AI806228, AI806407, AI628327, AI079833, W93248, AA478509, and AF044588.
HTEDO75	1918	767024	1 - 184	15 - 198	
HTEDK72	1919	766343	1 - 339	15 - 353	AI693509, and H95965.
HTEDJ92	1920	522827	1 - 294	15 - 308	
HTEDJ63	1921	508086	1 - 310	15 - 324	Z98257.
HTEDI09	1922	522969	1 - 397	15 - 411	AI797509.
HTEDI01	1923	961028	1 - 230	15 - 244	AC006960, AC005015, AL035249, and AL049569.
HTEDH90	1924	909165	1 - 403	15 - 417	R79137, AA314329, AA323430, U69560, AC007731, and AC005500.
HTEDH76	1925	522940	1 - 208	15 - 222	AC004945.
HTEDH42	1926	615250	1 - 459	15 - 473	C03196, C03292, F00515, AA361228, AW003009, AA626353, AW403239, W67213, AA314421, W05346, W63719, AI346486, W24987, D12319, D11537, AA423922, N45183, AR053393, and AF092130.
HTEDH30	1927	522936	1 - 237	15 - 251	AL049697.
HTEDH17	1928	522938	1 - 371	15 - 385	
HTEDH06	1929	869427	1 - 392	15 - 406	AC006251.
HTEDG75	1930	890715	1 - 358	15 - 372	
HTEDG26	1931	519947	1 - 384	15 - 398	AW246994, AA421090, AA421091, AA397662, AA375279, R83399, AI638717, AA306667, AA747622, and AC000378.
HTEDF96	1932	614726	1 - 323	15 - 337	AA242852, AA252186, AI129391, AA743400, AI934605, AA531278, AA705950, AA418351,

						AA834128, and AC006942.
HTEDF70	1933	522977	1 - 294	15 - 308		AC004983.
HTEDF60	1934	742368	1 - 356	15 - 370		AI656191, Z21349, and Z21348.
HTEDF22	1935	908406	1 - 291	15 - 305		AC002418, Z83843, and AC004386.
HTECE66	1936	522997	1 - 403	15 - 417		
HTECE62	1937	523002	1 - 407	15 - 421		AW241925, and AC005232.
HTECE61	1938	789732	1 - 543	15 - 557		N80927, AA400153, AI027600, W58447, AA813400, AA746206, AI139801, AA828177, AW375643, AI279610, AI359755, AA444123, AA443944, AA569017, AA451805, AI089230, AI632987, AI338403, AI262825, AA767495, AI005034, AA453635, AA454013, AI560993, AW250814, T30813, AW149100, AW327945, AW207031, AA629893, AI342923, AA922333, F37015, AI745194, AA676942, AI086189, AI276499, AW058509, AI682025, AW004973, AW009042, AI367703, AI445623, AI241535, AA441932, N73089, AW295548, AI188497, F04870, F10561, W58482, Z41848, T35208, AA548624, AI094343, AA923598, AW440500, W76342, AW080667, AI720047, T17396, R37034, F22096, R39180, AA833987, AA197182, AA426126, AW363378, AI797280, AA196359, T19458, AI743371, AA090309, R34367, AA446271, T61317, AW407104, N71508, AA075086, AA383602, C21530, AI371957, AA192312, N22129, N91820, AA374751, AA213591, AA813578, H43284, H97310, C00318, T10425, T98391, AA832076, AI049609, AA740854, AA349688, AA369853, and AL035405.
HTECE51	1939	870723	1 - 301	15 - 315		
HTECE39	1940	650885	1 - 389	15 - 403		
HTECE31	1941	508104	1 - 284	15 - 298		
HTECE08	1942	960428	1 - 421	15 - 435		
HTECD94	1943	527210	1 - 318	15 - 332		AI025190, AL137266, AC005071, AC005488, AC004878, and AC006014.
HTECD88	1944	527214	1 - 342	15 - 356		AA804334, and AW007980.
HTECD70	1945	527203	1 - 324	15 - 338		
HTECD65	1946	533795	1 - 328	15 - 342		
HTECD56	1947	527209	1 - 178	15 - 192		
HTECD15	1948	523029	1 - 402	15 - 416		
HTECC71	1949	508142	1 - 370	15 - 384		
HTECC45	1950	508124	1 - 317	15 - 331		AA406427, H66890, H64867, H66639, H69191, AA693972, AA410436, AA931060, N38830, H48140, AI247909, AA251684, N23377, N76083, AA887276, T61107, AW328038, AI681235, AW328039, AA608986, H72100, N71448, AA188574, C02442, H70867, R94076, AA394213, AA487534, T68446, AC005185, AL121877, AC006039, AL121578, AC006458, AC005544, AC005014, Z84481, AP000261, AP000100, AP000035, AC004696, AC002094, AC008040, AC005774, AC006157, AC005284, AL049834, AL080250, AC006150, AF048727, AL022393, AC004448, AC007001, AF129077, AF165147, AC008009, AC004202, AP000518, AC002383,

HTECC26	1951	508144	1 - 403	15 - 417	AB023054, AP000692, AC003119, U91325, AC006355, AL031542, AC005853, Z69722, AL031315, AL035461, AF011889, Z83826, AC004975, AC008085, AL022318, AC004664, AC005862, Z76735, AC004746, AC007286, AP001101, U80460, U91324, AL133162, AP000075, Z97180, AC002531, AC002511, AC003034, AL135922, and U95738.
	1952	678659	1 - 353	15 - 367	
HTECC09	1951	508144	1 - 403	15 - 417	AA393147, and AA398551. AA306529, AA306591, AA826008, AI089960, AA887528, AI333816, AA513786, AA524465, AI125407, AA541685, AA446158, AA315157, AI185832, AA603451, AI660483, AI871796, AI138696, AI563976, AI141745, AI479416, AI304867, AA938482, AI342761, AA281870, AA102814, AA586819, AA526476, AW157657, AI878833, C14084, AI815670, AI879393, C15292, AA931242, AA125855, W19566, AI081138, AA248470, AA070996, D59838, AW138570, AI660905, AA442677, D60576, AA776763, AI038860, AA527168, AI879973, H72163, AI096871, AA887522, AA535032, N29179, AA437187, C15125, AW163651, AA100697, AA070617, AA126067, AA682431, W21262, R58065, AI217985, W95562, H64391, H91983, AA352582, N53018, AA125841, AI356704, AA927737, AI336049, AA889266, AW272440, AA502617, AA431548, AI184304, AA833674, F35247, AA369535, W39436, AA281586, AA575968, W95435, AI056604, AI350076, C14543, AA878900, AA947125, W15344, AI537988, C15570, AI085201, AA732059, AI184964, AI569557, AI301035, AA429855, AI889555, AA513631, AI000301, AA592946, AA317358, AI797215, AA722721, AA758447, AA721039, AI339315, AA947500, AI149920, W37085, AA682224, AA962818, AA552223, C15228, AI073583, AI051738, AA737832, AA303269, AA548883, AA991817, AI869608, AA923511, AW297214, W07566, AI222363, AA991676, AI301328, AI376085, AI080573, AA364733, AI031902, W04779, AA878574, AA600861, AA779628, AA091291, AA322774, D81321, AI039006, D60527, AA782434, AI202852, H89937, AW192683, N80835, AA356010, AA301770, AA304243, AA129809, H91874, AI198092, D60707, T93983, N20273, AI271711, W24482, D60706, and AA369534.
HTECC08	1953	960439	1 - 341	15 - 355	AW086066.
	1954	508135	1 - 427	15 - 441	
HTECA44	1955	508132	1 - 408	15 - 422	R62332, H17378, and R25901.
	1956	728811	1 - 736	15 - 750	
HTEBP54	1957	715704	1 - 304	15 - 318	AI928432, AI291335, AI803224, AI298002, AI985197, AI924618, AA489696, AA489695, AI806154, AW138014, AI241232, AW291969, N36798, AA436451, AA765512, AA743624, AA020798, AA848065, AA436498, AI221817, AI768422, and AA015614.
	1957	715704	1 - 304	15 - 318	
HTEBO43	1958	503275	1 - 278	15 - 292	AA383834, AA383833, AW117332, and AW268492.
	1959	578544	1 - 355	15 - 369	
HTEBM87	1960	921321	1 - 408	15 - 422	H73473, and AA383702.
	1961	870732	1 - 560	15 - 574	
HTEBL53	1958	503275	1 - 278	15 - 292	AI204211, AW274576, AI285857, AA383617, AI394396, AA442838, AI218526, AI214386,
	1959	578544	1 - 355	15 - 369	
HTEBJ02	1960	921321	1 - 408	15 - 422	H73473, and AA383702.
	1961	870732	1 - 560	15 - 574	
HTEBH09	1958	503275	1 - 278	15 - 292	AI204211, AW274576, AI285857, AA383617, AI394396, AA442838, AI218526, AI214386,
	1959	578544	1 - 355	15 - 369	
HTEBL53	1960	921321	1 - 408	15 - 422	H73473, and AA383702.
	1961	870732	1 - 560	15 - 574	

HTEAX06	1962	960792	1 - 413	15 - 427	AA781925, AA725598, AA758847, AI671527, and AI125254. AW300891, AW182267, AI002121, AI393590, AW268430, AA812869, AI363725, AI937132, AI370331, AA431750, AA383228, C20655, and AI537879.
HTEAV22	1963	679394	1 - 449	15 - 463	HI6258, AI362696, AA159083, AI337351, AI049674, H05276, AI963664, AA612853, AA421018, R50945, AA398617, AI276451, AA868365, and AA383003.
HTEAU39	1964	503295	1 - 428	15 - 442	R45446, AA994896, AI285099, AI419926, AI219508, AI650680, R41613, AA383142, AI264406, AI942371, and AC005752.
HTEAT17	1965	667184	1 - 298	15 - 312	AA416657, AA394107, AA629341, AA382909, AI075928, AI150321, AI204602, AW022487, AA397912, AA862555, AI066604, and AA442269.
HTEAS02	1966	921323	1 - 527	15 - 541	AI203924, AA383061, AI215017, and AA861908.
HTEAR93	1967	503298	1 - 361	15 - 375	AA383056, and AA383057.
HTEAQ55	1968	732562	1 - 1106	15 - 1120	AI979276, AW117497, AW269774, AA701653, W46209, AA778787, AW269767, AI218590, N20493, W28100, AA039403, AA781351, AI025502, AI696076, W26315, AI281715, AA088596, N25525, AI220590, AW136955, AA758981, AA406069, AA972182, AI634149, AA628118, AI819755, AI215556, AA039283, N33500, AI218587, W46210, AA382922, AI476428, AI766748, AA724549, AA723963, R84858, R85787, AW087598, AW275213, C20812, and AC004805.
HTEAI96	1969	503533	1 - 421	15 - 435	AA382756, and AA382755.
HTEAH75	1970	503546	1 - 324	15 - 338	AA382618, and AA382617.
HTEAG47	1971	503623	1 - 411	15 - 425	AA707221, H91075, AA677780, H90565, AA382495, AA382494, and AI825267.
HTEAG08	1972	960469	1 - 322	15 - 336	AW298466, AA382538, AA504454, and AA382537.
HTEAB50	1973	724751	1 - 310	15 - 324	AA459803, AA382330, AW084476, AW118229, AA770485, AI393130, and AA894604.
HTEAA04	1974	925522	1 - 533	15 - 547	AA431127, AA432144, and AA382138.
HSWBV36	1975	708291	1 - 413	15 - 427	AA993042, and N22565.
HSWBT69	1976	867537	1 - 366	15 - 380	W25339, AA046193, AA449279, and U36384.
HSWBE29	1977	412991	1 - 394	15 - 408	AI034154, AI075224, AI273184, AA912285, AI950513, AI885608, AI335673, AI887898, AI080389, AW243126, AA912258, AI656815, AI869093, AA743734, and N62780.
HSWAS65	1978	953051	1 - 391	15 - 405	AI149166, AW134820, W74519, AI126334, AI458127, AI702779, AW241716, W74520, AI313414, AA325604, AI085318, AA028905, AI809343, AA927327, AA621660, H18963, W79859, and U87223.
HSWAS18	1979	666302	1 - 481	15 - 495	AI341837, H29745, AI744756, R86286, H27353, and C02105.
HSWAR63	1980	471236	1 - 343	15 - 357	AI368388, AI375597, AI333175, AI096336, AI143097, AI371774, AI863007, AI143646, AI401020, AI264622, AI955198, AI830291, AI871932, AI089379, AI361917, AI669393, AI083964, AI130018, AI284009, AI763092, AI313424, AI860304, AI761302, AI802694, AI689622, AI807536, AI889890, AI783822, AI984147, AI436614, AI831700, AI401294,

HSWAQ31 HPWTA06 HPWSA52	1981	697856	1 - 405	15 - 419	<p>AW166231, AI373088, AW440862, AI283398, AI628021, AI076054, AI160352, AI356262, AW303797, AW027683, AI076901, AI750565, AW138762, AW205241, AW131274, AW182727, AI633329, AW027104, AI826608, AI131379, AI082361, AW051864, AW007685, AW148788, AW015247, AI309293, AI761146, AW152138, AI917165, AI094866, AI991300, AW055285, AW189932, AW167782, AI819815, AI660514, AW152227, AI192788, AW138854, AW026436, AI625376, AI493229, AI435865, AI141874, AI140238, AI524717, AI985076, AW139124, AW205019, AW089459, AI147674, AI142533, AI283228, AI524717, AI985076, AI418837, AI452497, AI084650, AA761057, AI352600, AI365199, AI359053, AW134846, AI281009, AI189810, AI927109, AI475646, AW008134, AI347476, AI127254, AI798042, AI245694, AI084053, AI472105, AI85858, AI346716, AI805265, AI056708, AI168084, AW168327, AI335542, AW016943, AI763091, AW080734, AI344496, AW001416, AW134801, AW138795, AW139783, AW134778, AI083683, AI436570, AI356539, AI913071, AW291502, AW205777, AI364682, AW135748, AI805245, AW118495, AI378537, AI751342, AI017678, AA731725, AA743409, AI284044, AI367653, AI244522, AW129260, AI274414, AI336615, AI521300, AW206154, AI817686, AA768889, AA687148, AW204642, AW067873, AA748715, AW206063, AI344202, AW204658, AW134471, AW134992, AI498998, AW272093, AI751403, AI184103, AI365388, AI868143, AW029417, AI096546, AI193953, AI274606, AW068441, AW149182, AI475878, AI884460, AI056487, AI242557, AW075326, AW058138, AI956107, AA934582, AW087680, AW277100, AI937167, AW086079, AI992000, AI040279, AI440481, AI290523, AW103911, AI266204, AI383396, AI636832, AI872349, AI092810, AI382023, AI471042, AI745657, AW082335, AW207085, AW079700, AI991258, AI934795, AW150946, AI359264, AI797905, AI244599, AI205545, AI985061, AI952709, AI250781, AW170789, AI916414, AW150829, AI290207, AI208838, AI824627, AW137667, AI916148, AW169534, AI439477, AI126922, AW138184, AW139537, AI369691, AI018609, AW028207, AI858490, AI282372, AW014680, AI500554, AA775869, AW014451, AI123239, AI553795, AI554710, AI350901, AI241918, AI865208, AI274094, AI366682, AI379191, AI144370, AI417103, AI990960, AI871260, AI264233, AA533302, AA654830, AI284364, AW205575, AW207168, AW089185, AW137590, AI873120, M11167, M11120, M27830, U13369, X59734, AJ270046, M29181, X02995, X59733, X82564, X00525, V01270, AF061798, AF061799, U17964, U17965, U17962, U17963, J04633, AF074093, S48220, U34339, U34337, U34341, U34342, U34340, U34336, AF061800, U34338, L15286, AF132045, U67616, AF086136, D86039, AF061797, AR016103, A85605, A85520, A86292, A65652, E08821, A71562, AF059516, X59474, S78388, A22946, and L20636.</p>
				AI621111.	
				AA197067.	
				H87580, and AL035699.	
	1982	936026	1 - 611	15 - 625	
	1983	727294	1 - 336	15 - 350	

HPWDK45	1984	839559	1 - 521	15 - 535	R05355.
HPWDF03	1985	924978	1 - 701	15 - 715	W87370, A1168586, AA678331, T96677, W87371, and T96792.
HPWDE86	1986	785710	1 - 362	15 - 376	R34114, and R62645.
HPWCJ90	1987	789170	1 - 385	15 - 399	AA036882, AW073808, AW006251, A1992106, A1089385, A1095532, A1143143, A1979301, A1750308, AW001022, A1147683, AA046259, A1598152, A1201784, AW235719, A1696115, and AA011669.
HPWCG85	1988	638155	1 - 1025	15 - 1039	AW172969, AA601278, AA469230, A1376239, A1609972, AA847704, A1431434, A1249365, AA601680, AA829065, A1053934, A1042539, AA857812, A1281818, AW089016, A1620992, AA169245, AW089322, A1282629, AA480486, AA704101, A1446623, AA609834, A1859438, A1340151, AA130647, AA622479, A1912401, W60522, AA904211, AA491767, A1783911, AA563770, AA487142, AA992562, A1961983, A1417469, AW264901, AA828047, AA828867, A1133083, AA911590, AA484892, A1224583, AA573062, AW408767, A1279417, A1061313, AA704393, A1041970, AW407632, A1046519, A1445224, AA197019, T47138, AA578832, A1445934, A1053597, A1054418, AW303872, A1417464, AA587826, AA487645, A1500552, H38769, AA176605, A1355559, AA701105, A1636734, A1277373, A1613465, AA362349, A1989408, AA598605, A1355246, A1733856, W63553, A1598060, A1049931, A1243793, AW341955, AA985201, AA468956, A1762528, AA632765, A1189682, AA683279, F23338, AW105729, A1598056, AW157616, R91827, AA515631, A1362552, H95769, A1206841, AW410409, H71678, AC005740, U80017, U95090, AC006312, AC005696, AC005412, AC002565, AP000044, AP000692, AC005529, AP000113, A1035587, A1079304, AC004819, AF111169, AP000045, A1121603, A1035249, A1031311, A1031670, A1139054, AC005081, A1021546, AC005288, AC005071, AC005730, A1021878, AC004492, AP000555, AC004983, AP000112, A1035086, AC005952, AC006211, AP000330, A1021391, A1031657, AC005620, AP000557, AB023049, AC002094, AC004491, AC002115, AC005971, AC007792, AC006111, AC007057, A1024498, AC004765, AC002316, AC007707, AF196969, AC005225, AC005940, AC007226, AC000353, A1022238, AF053356, AC002350, AD000092, AC005837, AC005839, AB003151, AC004796, A1096701, AC004596, AC005037, AF165926, AC020663, AP000501, AC002312, AP000959, AP000140, AC005231, AC005067, AC004991, AR036572, U91328, A1078581, AP000031, AC005031, U78027, Z98946, AF001550, A1022318, AF045555, AC005776, AC005480, A1080243, AC005874, AF134471, AF001549, AF134726, AC006241, A1050307, AC005409, Z84469, AP000212, AP000134, AC005914, AC004953, AC004910, AP000350, AC006088, A1035457, A1049759, AC007363, A109627, D84394, AF111168, AC004531, A1031846, AC007216, A1034420, AC005803, AC004662, AC005049, AC007686, AC006049, AC005180, AC003007, A1133445, A1034429, AC006130, A1031281, U47924, AC005625, AC007298, A1031431, AP000553, A1035659, AC007666, AC006965, A1022326, Z93930, A1049795, AC006011, AC005695, AC002126, AC002302, AC005911, AC005324,

					AC004019, AF207550, AL035422, AJ003147, AC004185, AL049709, AC005666, Z83840, AC006285, AL031255, AF064861, AC006543, Z82244, AP000228, Z83845, AC006120, AC004854, AC005200, L44140, AC002477, U52112, AP000088, AL079295, AD000812, AL109801, AC006449, AL031284, AC005520, AL022320, AC004167, AC004253, AC005057, AC003029, U95739, AL021154, AL049692, U85195, AC005829, X87344, AP000248, AL050341, AL132712, AC009516, AF088219, AC005102, AC006360, AC005082, AC007283, AC007308, AL008718, AC000052, AC004832, Z83826, U91326, AL096791, AC006480, AL020997, AC004929, AC005089, AF030453, AL034548, Z95114, AP000558, Z81369, AC002425, AL034423, AF196779, AC007450, AC004448, AF196971, AC002404, AC006581, AC004000, AL031584, AC006544, AC005800, AE000658, AC005484, AC002470, Z93244, AL117337, AC005527, AC005358, AL109798, AC002091, Z86090, AL022302, U91318, U96629, AL022721, AC005280, AC004158, AP000695, Z82203, Z85987, AC007421, AC006254, M89651, AC006538, AC003963, AC007277, AC006255, AC005632, AC007227, AC005722, AC006501, AC002551, and AP000513.
HPWBF35	1989	707514	1 - 219	15 - 233	AA136312.
HPWBE47	1990	720563	1 - 532	15 - 546	T61306.
HPWAT23	1991	676323	1 - 277	15 - 291	W31570, and AFI36745.
HPWAJ85	1992	535157	1 - 326	15 - 340	AI681684, AI458401, AI936264, AW055212, AI200740, AI635739, AI973110, AW044010, R60842, AI690626, AA281860, AI823929, AI142509, AA781250, and Z95115.
HPWAJ39	1993	575271	1 - 202	15 - 216	N76233, and R18040.
HPWAI05	1994	932627	1 - 551	15 - 565	AI671077, AA506744, AI859744, AF047825, AL049757, AC005529, AL022721, AC004491, AC005823, AC005081, AC005527, AL132712, AL022316, AF001549, AC002312, AC002477, AC005015, U95742, AP000952, AC005488, AL035587, AP000501, AL021155, AC003982, AC006511, AF111168, AF109907, AC007216, AC000353, AC000003, AC005484, AC005037, AC008372, AC005837, Z93023, AL035450, AF088219, AC004675, AC004253, AL049761, AC006241, AC005911, AL139054, AL031848, AC009516, AC007227, AC005740, AC005694, Z99127, AC005666, Z95114, AC007993, AC005736, AC002470, AC002549, AC006430, AC005899, Z85987, AC002400, AC005225, U47924, AC002310, AC007686, AL080243, Z93017, AC005940, AC005696, AJ246003, AC004125, AC002072, AF111169, AC006277, AC004685, AC006254, AC006547, AC006312, AC005924, L78810, AC007225, AC003108, AP000555, Z84466, AP000553, AC002365, U52112, AC004841, AC005412, AC005565, Z84469, AC005291, AL109963, AL034420, AL021546, AP000694, AL121603, and AC006121.
HPWAG31	1996	693618	1 - 271	15 - 285	N59310, and W26272.
HPVAH71	1997	829301	1 - 378	15 - 392	
HPVAH41	1998	848632	1 - 658	15 - 672	AW084140, AI660275, AI159785, AA931541, R46761, AI017335, H69563, AI253649.

						AL046863, AI718728, AI860915, AA421105, AA780157, AA622029, AA564314, T85269, AI187002, H93474, AA862619, AA860857, N51712, AI092970, AI093731, AI288177, AA725376, AA397987, AI632608, N95238, AI383237, AW273559, AW014246, AW025440, N75603, AI089430, H84661, AI074224, AA877282, T96893, AA430388, AA994095, AA577687, AI962794, AW071881, AI147145, AA627632, AA757265, AI348280, AA292692, N62956, AI022266, AI039833, AI332399, N63622, H92137, AW452472, AA452012, W94925, W95270, N80289, T67556, AI800953, AI524405, AA937741, AA946602, AL046862, AI202094, AI471911, AW362569, and AF161509.
HPVAC74	1999	773298	1 - 623	15 - 637		AI803004, H82351, AI912547, AI684625, AI093039, AA043382, AI700890, AI016549, AA043383, AA789239, AA868305, T03714, AW49266, and AI990568.
HPVAB16	2000	526124	1 - 199	15 - 213		AW183886, AW295375, H73304, and AA455018.
HPVAB01	2001	961017	1 - 340	15 - 354		AI123463, AI025472, AI827469, AA916957, H86257, AI457871, AA748446, AW295278, AA058998, AA888811, AW293429, AA047229, AA012881, AI738469, Z65045, and Z65044.
HPRTI65	2002	753933	1 - 616	15 - 630		AA193128, and W24151.
HPRTI54	2003	728812	1 - 542	15 - 556		H80993, T58115, and T58181.
HPRTI16	2004	667652	1 - 540	15 - 554		AA454985, AA232735, AA454986, W25444, AW303344, and AI368936.
HPRCV66	2005	320393	1 - 543	15 - 557		AW450541, Z43026, T96106, and AC007377.
HPRCT83	2006	780264	1 - 470	15 - 484		AA032184, AA152299, and AC007182.
HPRCN03	2007	925420	1 - 513	15 - 527		AI074020, AI187913, and AC004056.
HPRCM12	2008	973740	1 - 582	15 - 596		Z81007.
HPRCL72	2009	766311	1 - 234	15 - 248		N53915.
HPRCI73	2010	764710	1 - 325	15 - 339		AA594588, and AI821697.
HPRCG46	2011	719340	1 - 450	15 - 464		HI17732, AA195383, AI268825, and AA609857.
HPRCD11	2012	967762	1 - 377	15 - 391		HG3477, AW386067, and AC003006.
HPRCC22	2013	526623	1 - 258	15 - 272		AL135490, AA460352, AI538075, AA635150, AA661590, AI926876, AI921744, AA557945, AI040051, AI144125, AA600202, AI049999, AA578245, AA112646, AA720732, AI344906, AI318548, AA640305, AI620666, AW341903, AW270258, AA469230, AA595661, AL135357, F00564, AA846923, AA482682, AA555232, AI910608, AA847095, AA767660, AL044966, AI749823, AA483606, AA570740, AA831714, AI568376, AA568204, AA430137, AW104161, AI753904, AA857296, Z36862, AW419227, AA045734, AA584241, AI434653, AA846944, AW021674, AA501410, AA086042, R95840, AW270385, AA505012, AI572680, AI079154, N72170, AA229113, AI279693, AW021116, AA493546, AI523356, AI821608, AI803824, AA191418, AW192419, AA828758, AL048275, N66775, AA367986, AW020094, AA164946, AA828840, AA994578, AI357762, AA808875, T57562, T41235, N23913, AW404543, AA862243, AI433952, AA872299, AA502532, AA804726, AA345665, AA573003, AA493245, AA568433, AA653139, AI926104, AA523718, AA584148, AW021399, AA601376, AI003391,

AW057760, R99617, AA713946, AA714956, AI249683, AL120708, AW165963, AA826134, AA828771, AA558402, AA558716, AA582554, AW272815, AI590404, AA631915, AA018207, AA487053, AI754257, AA302661, AI984168, AI791426, H6812, AI732473, AA525112, AA659360, AA749235, AA706291, AA182731, AL079553, AI356440, AA828802, AA828781, AA653672, AL035587, AC005601, AC007014, AC004953, AC002310, AC003966, AC006057, AC005488, U91326, AF198095, AC004531, AC003663, AF111169, AC001228, AL121754, AC003042, AL133245, AC005815, AL031589, AC004099, AC003688, AC009247, AC005899, AC007225, AL031595, AC005895, AC005913, AL008725, AC002425, AC008040, AC006312, AC005305, AL109963, AF124523, AP000359, Z84469, AC005726, AL117258, AC008134, AC002045, AC004765, AC005067, AL109628, AC005763, AC002036, AL022320, AL121657, AF154836, AC006064, AC005971, AB023049, AC005082, AL020993, AC004659, AC006080, AL050308, AL049776, AC004895, AC004448, AF217403, AC005519, AC005037, Z99289, Z97054, AF109907, AC016025, AL109801, U62293, Z93023, AC000085, Z98950, AL121653, AL117340, AC002470, AL049780, AC005081, AC004797, AC006449, AL135744, AC004858, AC009516, AC004000, AC005089, AL109952, AC006285, AP000255, AC005231, AC004796, AC005527, AC004150, AP000065, AC004771, AL132994, AC006511, AC003982, U63721, AL031666, AC005005, AC002404, AC007363, AC005304, AC004408, AC002472, AL031588, Z98750, AL133353, AP000213, AC005015, AP000345, AC005529, AC004832, AC007686, AF165926, AP000135, AL034402, AC005274, AC004493, AL031230, Z97353, M87914, AL022323, AC007066, AL021939, AL117330, AC007298, AC006958, AC004020, AL035420, AC006017, AP000031, AL035659, AC004009, AF069291, AC002554, AC006557, AC004834, AC004381, AL049766, AP000501, AL049843, AL022331, AC002544, AC005570, AL078581, AC020663, AC000052, AC006160, AC008498, AC005339, AC005914, AC005257, AL022158, AC005736, AC005911, AC005624, AC004019, AC005844, AC004673, Z95327, AC007664, AC008055, AC007917, AF187320, AL034419, AC007041, AC004962, AL022237, Z98949, AL022313, Z99716, AB022785, Z82190, AC004605, U43572, AC004458, Z82189, AB003151, AL021940, AL109967, AC004927, AC005972, AC004687, AP000553, AL021391, AL096701, AC004656, AP001053, Z93244, AC004905, Z84466, AC004887, AC012085, AC004703, AL133448, AF207550, AC005531, AL136168, AC003109, AC004821, AC000079, AC004230, AP000555, AL035405, AP000211, AP000133, AL031311, AC003098, AL109837, M84472, AL109657, AC004598, AC005412, AC004801, AF001548, AL049830, AC002492, AC002558, AL078602, AC002996, AC004841, AC006211, AL050338, AC004685, AL034421, AF196779, AF196969, AC002565, AL049760, AL008582, AL080243, AC005618, AC006277, AC000134, AC005280, AP000347, AC005829, AL022315, AC005969, AC002073, AC003101, AL096707, AC004859, AL136295, AL133371, Z93017, AC007021, AP000356, Z93241, AL096677, and Z98051.					
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HPRCA02	2014	917289	1 - 376	15 - 390	AA564925, AI904944, AA666295, AW151247, AA972523, AA102737, H62923, H86579, AI624551, T05617, AA984920, AL044271, R77715, T94072, AA468974, T05684, AA230025, AA468371, AA228979, AA229823, AA484892, AA228368, AA224889, AA468505, AA228269, AA772704, AL137946, AA402113, AW243945, AA593828, AA467943, AI671077, AL041815, AA614254, AA224815, AA720582, M85967, AA664248, AI801563, AW419126, AA181479, AA888638, AL038533, H93152, AA550959, N27874, H81012, AA502110, AA714110, AA558404, AI278211, AI560073, W24312, AA612578, AA298647, AA890060, AA377325, AA745628, AI819391, T71936, H54252, R99076, AI118912, AW105463, AA581525, AA780933, AI369076, AA322484, AL047467, AA747977, AA550989, AI668605, AI567391, AI306717, AA548221, AA302978, H94979, AW242279, AI249688, T07878, AA329535, AA773463, AA631729, AL041681, AA482792, AL041682, AA630854, AI500315, AF031078, AF030876, AF031076, AC006344, X05151, AC005899, U07563, AL033539, AC001226, AC004983, AC009946, AC003002, AL022336, AP000207, AP000129, AC004112, Z82215, Z73913, AL049712, Z93023, AL035457, U52112, AC005207, AC000090, AC005157, AC005186, AC005089, AC007312, AL133355, AC004961, AC005841, AF196971, Z93017, AL024498, AL035661, AL122020, AC012627, AC006014, AC004593, AC005488, AL031282, AL023575, AC007371, AF111168, AL031003, Z49237, AF124730, AB014077, AC000387, AC004209, AP000514, AC000003, AC004686, AC004241, AC003963, AL035461, AL133247, AC005212, AC005393, AC005484, AC003015, AL031587, X87344, AJ246003, AC004539, AC006034, AL049758, AF064863, AC010200, Z68284, AC005856, AP000289, AP000042, AP000110, AC002073, AL096791, AC004770, AC007436, U91321, AC007934, AL121658, Z83844, AC006387, AL022330, AC004032, AC005751, AC004963, AL136504, Z82976, AF001552, AC007666, AF109907, AL034347, AC007040, AC005372, AC002365, Z68276, AP000261, AP000035, AP000100, AC005911, AC004022, AL022395, AC005343, AC004531, AC005252, AL121782, U73479, AP000096, AC004223, AC005588, Z86090, AC007279, AC006023, AC007565, Z86064, AP000503, AC005067, AP001058, AC005829, AC002369, AC007639, AC004159, AC002538, Z98941, AC010205, AC005409, AC005874, AF134471, AL135744, AC004953, AP000355, AC009542, U35114, Z85986, AL049795, AC005620, AC004865, AL031657, AC005011, AC004673, AC004858, AL023553, AF048729, U62631, AC006080, AF134726, AC005726, AL031295, AC003998, AF205588, AC005280, AP000691, AL049569, AL031186, AD000092, AC004887, AC005045, AC004477, U91319, AL008734, AC006445, Z70280, AC002468, AC006367, AL009031, AC002326, AC005412, AP000223, M57678, U96629, AC003689, AC003043, AC006468, AC010170, AC000115, AL008721, Z97632, AC002040, AL035414, AC005913, AC005919, AL121769, AC004805, AC004815, AC005837, AL139054, AC003101, Z49258, AC005101, AP000303, AP000046, AP000114, AC004585, AC005695, AC004388, AC006515, AF064866, AL031311, AP000502, AC005300,
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HPRBN23	2015	467480	1 - 442	15 - 456	AC002395, AC006965, AC007536, AL031885, AL021917, AC006076, AC005383, AL032821, AC006211, AC005375, AC004035, AC005362, AC007205, AC004663, AC005884, AC004941, AC002402, AC006270, AL133163, AL133500, AC009330, U85195, AC007406, AC005041, AL022163, AC004890, AP000690, AL050341, AC006262, AC004460, AL031666, AP000689, AC004886, AL035413, AP000553, AC009516, and AC004491.
HPRBI87	2016	695116	1 - 229	15 - 243	AA148577, AA371499, AI190166, AW182200, AW450886, and AL080125.
HPRBH80	2017	781636	1 - 395	15 - 409	AA371425, R08248, W78735, AA002229, AI034386, and AC004582.
HPRAV80	2018	781637	1 - 574	15 - 588	AI796794, H16396, AW450892, H06067, AA885838, AA370953, R40187, Z38928, F01486, F02763, and F04922.
HPRAN56	2019	503140	1 - 455	15 - 469	W55957, AI379296, AI191798, AA987330, AI688094, AA001362, AI655136, AI277583, AW235235, AI080751, AI341857, AA936711, AA907791, AA001353, AW002519, R00840, AA370556, AA897172, and R01496.
HPRAN50	2020	724753	1 - 334	15 - 348	AA370553, and AA370552.
HPRAJ75	2021	766496	1 - 351	15 - 365	AA370391.
HPRAG73	2022	764757	1 - 734	15 - 748	W94997, AA370226, and AF123462.
HPRAG45	2023	484691	1 - 268	15 - 282	AA370201, AL031295, AL096775, AL034548, AL022323, AL049757, AL117258, AL021707, AP000031, AC003982, AC009516, AP000359, Z95115, AC002538, AC005031, AC005519, AP000135, AP000557, Z83844, U80017, AC005406, AC005261, and AC004983.
HPRAF86	2024	784594	1 - 219	15 - 233	AA369988.
HPOAB37	2025	789290	1 - 526	15 - 540	AI670779, AA384366, AA687253, AA505096, AA732524, AI525876, AA461291, N50753, AA461408, AI095123, AI393841, AI141520, and AA522490.
HPMSH94	2026	796839	1 - 599	15 - 613	AA214535.
HPMSB35	2027	707476	1 - 245	15 - 259	W05600, and U47671.
HPMMK05	2028	928283	1 - 824	15 - 838	AI312886, AA709064, R25113, R25114, AI271454, and AW131860.
HPMMB08	2029	957945	1 - 679	15 - 693	N57273, AA975894, AA078184, AW271847, AI720195, C13996, R67746, AI469577, AA322542, AI580260, AI926706, AI338117, W60077, AA865083, AA663975, W01985, AI039539, H72865, AA747234, W04464, F07235, AI253290, AA604201, AW270771, AI277347, AA492527, AI039125, AI266359, T65747, AI581433, D44787, T78912, F02611, H58207, AA577754, AA297195, AA630122, AI884861, AI160427, AA481811, AA721530, AA363003, AI288033, AW243945, R51217, AA721523, AI678581, R56848, AA078137, H01327, AA745351, F10272, AA161198, H67098, R67701, AA745383, H11450, AA484419, AA484370, AA678616, AA664248, AW270429, F35684, T90962, AA668166, AW270351, AA714073, AA491423, T05617, AA018895, AA478518, H01243, AA376358, AA780933, AI366993, AI859906, AI278847, AI915081, H71449, AI869786, AI679221, AI167550, N63848, T30418, AA457408, AW019964, AA309362, AA013366, T07903, AA345594, N77384,

					AA679353, AA302520, AA665908, AA772873, N57674, AA457254, A1927261, AL134418, AL031670, AF044083, AC005972, AC002395, AL136295, AF075066, AC005243, AF001550, AC007684, AL133289, L16854, Z82189, U52683, AC006360, U89336, L35668, Z49236, AF135187, AC007292, Z84489, AC007421, AL021579, AC005377, AC005383, AC007240, Z99572, AC005612, AC005620, AL133246, AC007406, AC007283, AC004476, Z99130, AL009183, AC000015, AL031115, AL008635, AL035587, AC004134, AC006000, AC006014, Z82214, AC005099, AC000378, AL035653, AC004552, AL133396, AL020995, AL049646, AL079304, AC005325, AC004887, AC006079, AC005488, AC005041, AC007207, AC003037, AF003626, AL109662, AC004186, AC002451, AL049766, AC000045, AC004811, AL008725, Z97630, AC002550, Z82244, AC005067, AC005231, AC006597, AL031291, Z98742, AL022326, AC005875, AL049759, AC007130, AL035415, AC007314, AC006316, AC012331, AC003665, AC004448, AL008723, AC005799, AL035091, AC005921, AC005747, AC007327, AL031681, AL021937, AC008126, AC005261, AC009509, AL031733, AC004382, AC005348, AP000517, AB023054, AC006251, U96629, L29766, AC004792, AC002984, AC004791, AC002316, AL033523, AL022166, AL034379, AC007041, Z82182, X54486, X13922, AL139054, AC006064, E12647, Z49155, AC004693, AC005759, AC002309, D87013, L48038, Z82208, AC005778, AP000300, AP000563, AC002390, AC006958, AF042484, AC004814, U07563, AC004938, AC004771, AP000113, AP000045, AP000133, AP000211, AC005800, AL049610, AC004703, AL031622, AC004929, AC007128, AC004991, AC005060, AC006509, AF030453, Z83822, AC002554, AC003106, AL132712, AL021154, AC003663, AL096773, AC006044, AC002476, AC005969, AC006026, AC006011, AC005535, AC007395, AC005088, AC004674, AL096701, AC004491, AL133238, AC005722, AC005042, AL049776, AC005291, AC005516, AL133244, Z95114, AC005015, AC005406, AC000353, AC005914, AC005225, AP000688, AC004650, AC004775, AL035420, AC005014, AC007349, AC007637, AC004623, AC004961, D84394, AC002480, AC004796, AL133445, AC004983, AP000130, AP000208, AC007955, AL049832, AP000247, D87009, AC006501, AC007792, U47924, AF037338, AF091512, AC004453, AC005209, Z98304, AJ003147, AC007011, AC001231, AC005082, AC002375, AL008734, AL021578, U95740, AC006013, AL033527, AC005412, AC005193, AC007198, AL135746, Y17293, Z68756, AC002054, AC002472, AC007664, and AC008018.
HPMKP06	2030	933895	1 - 328	15 - 342	AA436495, A1801028, and AB002353.
HPMKC05	2031	930874	1 - 501	15 - 515	R97706, and Z73979.
HPMJT12	2032	969483	1 - 663	15 - 677	T84974, T91224, R00550, and R00654.
HPMJN08	2033	958009	1 - 377	15 - 391	R06344, AW452106, AA729350, AL031295, AL122023, Z99128, AC007637, AC007298, AL022166, AC007917, AC004779, AL008635, AC007151, AC018633, AF109907, AL022721, X55448, and L44140.
HPMIK11	2034	965636	1 - 504	15 - 518	H54909.

HPMJJK03	2035	867615	I - 493	15 - 507	AW193499, T41385, AA325521, AA417987, T05187, AW440956, AW439999, AA907133, AI000677, AI537915, AI791144, AA844107, AA287035, AW298615, AW088364, AI537814, AA715387, AA523882, AA687547, AI302974, AA121818, W46473, AI798234, AA906440, AL120129, AW148336, AA484366, AI801031, AA308708, R55092, AI821120, AI688963, AI821864, AA018440, AI660071, AA334287, AA069926, W27874, R96138, AI811076, AA767864, AA227741, AC011594, AC006538, AC002126, Z68871, AC004156, AL133500, AL031230, LI3972, AC004812, AL034423, AC002400, M61107, U62317, AC005067, AC003663, AF111170, AF059321, AL049758, AC004104, AF155238, AC005803, AP001065, AC004703, AC002365, AC007279, AC002394, AP000365, AL031686, AP000547, AC002565, AC005049, AC007263, AL022721, AC006966, Z97630, AC006509, AL050318, AC004887, AC003098, Z85997, AC007868, AL031295, AC004253, AC004890, AC004876, AC002558, AC004916, AL009181, AC002116, AC002984, AC002070, AP000555, AC005578, AC004674, AC005323, Z95331, Z93930, Z82206, AC009263, AL022476, AF196970, Z95115, AC006125, AC002551, AF114156, AC006157, AP000104, AC003982, Z98044, AF121781, AL031280, AC004985, AC005015, AP000344, AL049779, AL022336, AC004814, AL031681, AC003013, AC004962, AF061032, AC000085, AC002425, AC005519, AC005880, AC007040, AC002524, AL034400, AC004149, AP000510, AP000345, AC008042, AC005520, AB023048, AC002036, Z73964, AC009533, AL132777, AC004991, AP000270, AJ011932, AC003684, AP000032, Z82195, AC006360, AC005800, AL121852, AC000086, M63543, M63544, AF181897, Z84487, AC005821, AL049569, AC006026, U95740, AC002464, AF050154, AC007229, AF020802, AP000687, AL035414, AC004383, AL117694, AC004990, AC002312, AC003950, AC002985, and AC004084.
HPMJJ11	2036	965627	I - 487	15 - 501	AI244898.
HPMJE06	2037	939682	I - 575	15 - 589	AI022159, and AI240345.
HPMJA11	2038	965628	I - 446	15 - 460	H85685, H82116, H85672, and H92336.
HPMGX92	2039	491004	I - 561	15 - 575	AI733856, AI627614, AA587728, AA573722, AI133083, AI354333, AI270370, AI524193, AA458452, AW194325, AA683069, AA491423, R67701, AI049999, AA614163, AA513851, AC007055, AC005527, Z83844, AC005529, AC007792, AC006026, AC004832, AF196971, AP000355, AF111168, AC007371, AL049757, AC002477, AC005488, AC005531, AC006441, AC005015, AC006139, AC002565, AC005500, AC005837, AP000555, AL022721, AC007731, AC005071, U47924, AL121603, AB026898, AC005902, Z82244, AC000025, AC007386, AL117337, AC005049, AL033527, AC004895, AC005164, AC005011, U78027, AC005291, L77570, AC005696, AC007546, AL109627, AC005180, AF130342, AL133404, AC008044, AC006039, AL121658, AL049776, AC006064, AL079342, AC007541, AL096791, AC004448, Y18000, AL035405, AP000014, AL049839, AL078638, AF029308, AC004890, AC005971, AC004882, AC004991, AC004815, AC007842, AC004525, AL035681, AC005081, AC009247,

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HPMGR15	2040	660374	1 - 429	15 - 443	N95527.
HPMGO88	2041	463906	1 - 460	15 - 474	N66134.
HPMGGM39	2042	705460	1 - 1424	15 - 1438	AW027268, AW299861, AI057303, W01903, N80342, N91193, AA010796, N68397, N64546, AA011135, AW194796, AA133637, N71008, AA393085, AI284257, AA133638, AI017033, HI2527, AA412114, R27162, AA365161, W01706, N58095, and AI288082.
HPMGJ16	2043	662021	1 - 214	15 - 228	AA297666, AI219169, AA228459, AA503119, AA829576, T07039, AI732869, AI821987, AA707849, AW250905, AI799327, AA489571, AA516047, AA626823, AI610376, AA381750, AI500453, AA424438, AI244157, AW179306, AC005015, AC006271, AC007637, AC002310, AC005484, AF207550, Z99943, AP000066, Z93016, AC006120, Z97053, AC007237, AC005666, AC005280, AP000466, AC007308, M89651, U50908, AL133485, Z93017, AC003043, AL035461, AC005088, AL109801, AP000353, AC004477, AC004223, Z75887, AL008718, AC005067, AL022312, AC007938, AL133448, AC006141, AL022163, AL109984, AC002470, AC006511, AC005091, AC005899, Z98749, AC007285, AC003684, AC004962, L81691, AL009183, AL121653, AL049869, Z94056, AC002996, AC012384, AP000030, AC006441, AL109865, AC003007, AC004491, AL031427, AC002365, U85195, Z86090, AC002544, Z93241, AL034429, AE000658, AL031311, AC006480, AL049748, AC007055,

HPMGD63	2044	694518	1 - 682	15 - 696	AC002527, AL049635, AL022336, AC003982, AC006251, AL031005, L78810, AC005479, AC003665, AP000550, Z98050, AL096701, L34079, AL031722, AC005089, AC010077, AC008018, AC003111, AL132712, AC005971, AC005632, AC005225, U80460, Z84476, AC005102, AC004975, U95740, AC002395, AC005722, AC003663, AF069489, AC006059, AC005326, M87923, U95742, AC004973, AC006039, AC006211, AC005412, M63480, AC018769, AC001231, AC002425, AC004262, AC004882, Z83849, AC006450, AP000505, AL022165, AP000694, AL035684, AD000092, AC005034, AC006312, AC005901, AC006257, AL035398, Z93783, AC005377, AC004983, AL133246, AC004895, AC005670, AF117829, M63544, AL022313, AL021368, AC005291, AL023807, AL031670, AC005324, AC002476, AB023049, AC006505, AC008009, AC004076, AC006501, AC005332, AC006160, Z99716, AC007435, AF109907, AF129756, AC007283, Z81369, AL031432, AL133245, AL049843, AL008735, AL023096, AL008730, AC010170, AL024498, AL080243, AC005753, AC005874, AC004922, AF134471, AC006965, AC004020, AC005261, Z81314, AF196971, AC005005, AP000512, AL023803, AC005755, AC006581, AL031283, and U91322.
HPMFX29	2045	690704	1 - 616	15 - 630	N59650, Z40592, F02367, and AA480778.
HPMFL73	2046	867670	1 - 717	15 - 731	W84490, W84350, AL044564, AI972017, AF086479, AF097027, AF097026, and AC002992.
HPMFC02	2047	920327	1 - 904	15 - 918	AA773011, and AF047825.
HPMFB26	2048	867674	1 - 348	15 - 362	AI361020, AI806300, AI339924, AA972324, AI689765, AI141310, AI798724, AI005122, AW015619, AI002107, AA721275, and Z59058.
HPMEG77	2049	772503	1 - 397	15 - 411	AA736385, AA262258, AL022164, AC005520, and AC007559.
HPMDQ89	2050	880787	1 - 444	15 - 458	AA178897, AA178882, and AA179898.
HPMDP10	2051	968350	1 - 415	15 - 429	AI634152, AI624814, AL135959, and AL049631.
HPMDF06	2052	954567	1 - 114	15 - 128	AW002399, AW450136, AI624994, AW082789, AI936619, AI953139, AA923323, AI377859, AI808017, AW452164, and AL109754.
HPMAM93	2053	791407	1 - 361	15 - 375	W28809.
HPMAL77	2054	772740	1 - 628	15 - 642	R42698, AI921147, AW001714, AA985608, AW025311, AI367373, and AA369641.
HPMAL73	2055	764752	1 - 155	15 - 169	AA149508, H66540; H53279, R99964, and AA369352.
HPMAK71	2056	503690	1 - 428	15 - 442	AA369348, AA018792, and AI439103.
					AA369278, AA369277, AA368633, AA297498, R86114, R92608, AC008101, AC016830, AC005736, AC006252, AC002477, AL024507, AC016027, AC006205, AC005303, AL035458, AL031683, AC004966, AC005695, AL031295, AL035682, AC005082, AL008729, U52112, AL109764, AC007350, AR036572, U91328, AF003529, AL049839, AC006213, U95742, AC004477, AC002369, AL035420, AC004916, AC005666, AC007371, AF111168, and AC007216.
HPMAI83	2057	781518	1 - 396	15 - 410	R10536, and AA369467.
HPMAI80	2058	572808	1 - 331	15 - 345	AA369413.

HPMAI10	2059	968695	1 - 202	15 - 216	
				AA303040, AA369200, F18842, AA535216, N23913, F17700, AA489939, AA603530, AI281818, AA829044, AI349580, AI682665, AI884383, AA659608, AA633762, AA385798, AI538658, AI047349, AA993818, AI537458, AI251429, AA463590, AW088745, AI439910, AA837035, AI041894, AA633920, AI354564, AA701080, AW068316, AA584125, AI087040, AA376760, AA639946, AA312303, AA372949, AA679794, AA502818, AI054333, AA661499, AI753113, AA302969, AI814739, AA449997, AI079734, AI453714, AA994578, AW023111, AA608751, AW085623, AA947269, AW079664, AI382324, AI537424, AA984187, AW084246, AW402458, AA621838, AW149156, AW302017, AA722039, AA904137, AA613624, AA601356, AA452906, AI933714, AA714322, R92983, F31380, AI119600, AW410354, AA483381, AA362714, AI056177, AI798493, AW198976, AI583321, AI207424, F16133, AW268277, AI383057, AI053911, AI925491, AA338262, T57767, AA779783, AI590593, AA847622, AA484370, AA484419, AI860587, AA811208, AA157458, AA601327, AW196014, AI254779, AA282820, AA083003, AA084609, AW073510, H45698, AI754037, AA579208, AA558404, AI002941, AA078337, AI054352, C14692, AA715173, AA206132, AP000695, AC007999, AC006333, AC005565, AC004659, U91326, AC005666, U63834, AC005821, AC005015, AI031311, AI022323, AI050307, AC002544, AC002477, AP000556, AC005069, AC005399, AC005412, AC003100, AC005803, AC003959, AC005602, AP000114, AI035495, AI135744, AC005011, AC007731, AI229041, AC005500, AC003665, Z95118, AP000512, AI049636, AC005387, AC000134, AI049757, Z95114, AC005225, AC004821, AC004386, AI034423, AC004883, AI049776, AC008015, AB023049, AC006241, AC004228, AI035659, AC005081, AP000557, AI133448, AC004253, AC004263, AC004408, AC007279, AC007327, AC006538, AI109984, L35676, AI021394, AC004655, AC008394, AI031258, AC004167, AC005612, AC004491, U82828, AC005940, AI022165, AC005837, AB023050, AC006441, AI022318, AC005022, AI031589, AC007225, U41483, AC002418, AC005920, AC005759, AF017104, Z84480, Z93244, AI035684, AC005206, AC004232, AC006141, AI121748, AC007056, Z98044, U33956, AC005207, AC006050, AI035086, AF165926, AC005519, AI023584, AC005696, AP000511, AI023807, AC009516, AI031296, AI021391, AI033525, AC004472, AI121603, AC005695, Z85986, AC002551, AC005667, AP000502, AF111168, AC004148, AI049692, AI049869, U95742, AC018633, AI132774, AI034417, AC003982, AC004587, Z97353, AC003035, AI022476, AC003669, AC007308, AC007216, AI008726, AI022721, AI133289, AI133396, AI020993, AC006285, AC005535, AP000696, AC004900, AC005755, AF190465, Z69707, Z98750, AF134726, L44140, AC005049, AC002300, Z83826, AC005377, AI034420, AF002223, AC003684, AI050348, AI050325, AI049795, AI133163, AI031587, Z98946, AI031295, Z99496, AC002400, AC005899, AI024507, AC004895, AJ246003, AP000212, AP000134, AC004884, AC004049, AC008125, AF047825, AC005368, AC005875, AF207550, AI035420, AI132712, AI080243, AP001053, AC005921, AC007238,	

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HPMAH85	2060	783344	1 - 436		15 - 450	N24966, and AA369334.
HPMAH56	2061	867711	1 - 378		15 - 392	AI969185, AA369304, AA369303, AC002404, AL034417, and AL133163.
HPMAB10	2062	968723	1 - 538		15 - 552	AA400632, AA400317, AA513753, AI188727, AI148002, AI797479, AI090223, AI833007, AA676886, AA740345, AA536076, AI336523, AI191303, AA978356, AI017725, AI128273, AA639692, AA468753, AA724081, H27059, AI879456, AI500369, N41692, R07494, AA252085, AA368986, AI436367, AW363134, AA838338, AA947905, AA707248, AA199605, AA670492, AA633704, AA931186, AW081785, AI554783, AI432454, AA927473, AI886832, AI886932, AA542849, U75998, F34689, AI970899, AI865318, AI142293, F26406, R07547, AA811357, AI815926, AI815728, AA353038, and AI831322.
HPLBW22	2063	679217	1 - 271		15 - 285	AA101449, and AA368833.
HPLBW02	2064	921331	1 - 501		15 - 515	AA644353, AI305162, and AA368822.
HPLBT54	2065	731065	1 - 524		15 - 538	R77180, and AA368801.
HPLBT53	2066	728517	1 - 436		15 - 450	AA429609, AA368800, Z68274, and AL117391.
HPLBS41	2067	712707	1 - 546		15 - 560	W69937, W69806, AA368743, and AF086311.
HPLBQ96	2068	796069	1 - 208		15 - 222	AI950844, AA970836, AA368531, AI761793, AW071107, R68649, and C00439.
HPLBO90	2069	787208	1 - 352		15 - 366	AA404593, AI732819, AI821540, AA459410, AA368625, and AA404736.
HPLBN79	2070	781854	1 - 313		15 - 327	AA368571, AI565323, AI479183, and N49068.
HPLBB47	2071	975477	1 - 733		15 - 747	N40247, AA467841, AA467897, AA368245, AI017480, AA973025, AA860186, AA305650, AA305127, AA307746, AW067937, AW299379, AC005881, and AL023280.
HPLAX14	2072	727885	1 - 500		15 - 514	W69552, AA368102, R50327, W21480, AA477047, AW383764, AA356448, AA368997, AC005071, AF161081, and AF161080.
HPLAV44	2073	715732	1 - 481		15 - 495	H53753, AW386067, AA367999, H63477, and AC003006.
HPLAI10	2074	968707	1 - 562		15 - 576	AI128337, AA572738, and AA367352.
HPJFA10	2075	963322	1 - 594		15 - 608	AI810835, and AI817587.
HPJEV95	2076	929723	1 - 515		15 - 529	AA159265.
HPJEU01	2077	928408	1 - 359		15 - 373	RI9571, AA468022, AA583898, AW364981, AI872020, AW276817, AA469451, AA828749, AL119691, AA169263, AA502860, AI110688, AA501821, AA580808, AI801600, AW303196,

AI699710, AW274349, AA665021, AA362698, AA806796, AA724333, AA508034, AL042853, AA507824, AI284640, AA548058, AI247199, AA812139, AI305766, AI053790, AA581903, AI634384, AW193265, AW103758, AI963720, AI635279, AW301350, AL044858, AA521323, AA299761, AA521399, AA533725, AA513141, AW084252, AI345157, AI476312, AW440545, AI687343, AW028392, AA984708, AA584167, AI061334, AI270117, AA531079, AA491814, AA714453, AA448231, AW438643, AA525824, AA452563, AA847952, AW062682, AA828042, AA618452, AI564454, AL138265, AW023500, AW265009, AI144101, AA372481, AW419237, AW327868, AA774222, AA808877, AA623002, AI207020, AA523837, AI355206, AI350211, AA219115, H85842, AI311557, AI619997, R97780, AA576336, AI149478, AA490183, AA480772, AI017415, AI686267, AA541423, AA634889, AI908381, AA613397, AA610491, H73082, AI860013, AL045053, T74382, AA478355, AL046409, AW440497, AI110760, AA604333, AI289067, AA781010, AI754658, AA715255, AA715267, AA483771, AL043009, AI281881, AA551503, AW273218, AA826671, AI307608, AW302903, AA468456, AI536665, AA653375, AA658362, AA503154, AI801482, AW274346, AW168618, AI240168, AA702614, AA577906, AI445674, AI624142, AI783494, AI345518, AA351056, AA494097, AI885249, AA828677, AI633390, AI669453, AI744995, AI207496, AA782304, AW276827, AW410400, AI537955, AA847499, AW149339, AW265170, AW157608, AW269488, AI568678, AI054343, AW196064, AA552843, AI583283, AA788982, AW050498, AW088202, AI434695, AW276435, AA573003, AA610271, AW270382, AA954924, AW268973, AL045808, AL046156, AA664909, AA620525, AI744188, AL119713, AW238278, H18959, AI499588, AI357288, AI821271, AI357212, H63262, AI085719, AI814735, AI003751, AI246119, AW080125, AW408047, AL038705, W79504, H66632, AA220943, AI828208, AW264934, AA405453, AI254316, AL079511, AL049869, AL035462, AL078474, AC005911, AC003977, AC007564, AC005288, AC007308, AL132716, AC004884, AC005091, AC002470, AC005212, AI239318, AC004655, AC004531, AC011421, AC003009, AC005376, AC008275, AC006312, AC005037, AF003528, AF029308, AC005274, AC004883, AC004814, AL133353, AL023284, AL022147, AC018633, AC005839, AC005082, AC007686, AL049647, AC004538, AC006270, AL008725, AC006037, AC007099, AC004690, AC005324, AC007919, AL133321, AL022165, AC008079, AC004894, AC005028, AL121578, AC007226, AI003147, AF015153, AC006238, AL096701, AC004167, AC004622, AC010168, AC004832, AF036405, AL121603, AC002429, AP000567, AC005411, AC015853, AC002064, AC005531, AC002452, AL031651, AC007750, AL109847, AL031682, U69569, AC007151, AC007731, AC004544, AP000049, AF130342, AC005224, AC007051, AC002310, AC004905, AC004216, AL049697, AC006360, AP000311, AL049825, AC005180, AL121658, AC007450, AP000275, AL049556, AL022322, AC004587, AL049696, AF130351, AC007751, AC004010, AC005614, AC005820, AC003950, Z83846, AC008040, AC005246, AL031681, AL049757, AC005019, AC006207, AP000105, AP000037,				
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HPJET11	2078	965894	1 - 588	15 - 602	N62272, and AL049662.
HPJES17	2079	859867	1 - 426	15 - 440	AL469935, AA035546, R54113, T27117, and H41850.
HPJEL02	2080	918315	1 - 318	15 - 332	AA001172, and AC006987.
HPJEG53	2081	974074	1 - 505	15 - 519	AC006137, and AC007160.
HPJDW93	2082	867759	1 - 715	15 - 729	AA213989, and AW016127.
HPJDT03	2083	922815	1 - 388	15 - 402	AA446260.
HPJDP54	2084	949149	1 - 287	15 - 301	AA621949, and AI935081.
HPJDF61	2085	889928	1 - 757	15 - 771	C14389, AA360910, H81346, D80195, C14014, D51423, D81026, D50979, C15076, D80164, D59467, D59502, D59275, D80193, D80227, D80038, D80166, D58283, D80022, D81030, D59859, D59619, C14331, D80210, D80391, D80240, D59787, D51799, D80253, T59438, D80043, D80269, D80212, U82828, AC005668, AF036405, AL096867, AC005300, AL050306, AC007688, AC008044, AC007052, AC004967, AC005071, AC004913, AL031666, AC007276, AC006509, AJ003147, AP000502, AL109657, AC003041, AC005529, AF023268, AL080243, D88547, AC004990, AC020663, AC003071, AC004223, AC005829, AF053356, AC005821, AC004150, AF134726, and AC010206.
HPJDC01	2086	915056	1 - 470	15 - 484	AI279943.
HPJDA25	2087	951281	1 - 572	15 - 586	AW408615, AI815752, AI906637, and AF047690.
HPJCU29	2088	928407	1 - 615	15 - 629	AW339568, AA525000, AW087208, AI284640, AA350859, AI471481, AA649642, AW276827,

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HPJCT81	2089	494874	1 - 401	15 - 415	T47764, AL240418, AL042373, AL680840, and T23659.
HPJCT26	2090	559949	1 - 628	15 - 642	
HPJCS73	2091	975087	1 - 540	15 - 554	AC009533, and AC008013.
HPJCS43	2092	715082	1 - 426	15 - 440	
HPJCS32	2093	699046	1 - 261	15 - 275	
HPJCN60	2094	887600	1 - 408	15 - 422	AC005754, and AF152495.
HPJCL55	2095	670083	1 - 580	15 - 594	AA460600, AA971933, AA461528, AI028767, AW104221, AA916255, AI807812, AA815321, AA609716, AA897273, and AA382975.
HPJBU40	2096	710928	1 - 411	15 - 425	T79399, T79485, and AC004460.
HPJBU09	2097	625362	1 - 520	15 - 534	HI4685, HI1846, and Z42042.
HPJBS74	2098	765390	1 - 579	15 - 593	AA199800.
HPJBS52	2099	726535	1 - 505	15 - 519	R69458.

HPJBS35	2100	867818	1 - 427	15 - 441	R08072.
HPJBL76	2101	769889	1 - 764	15 - 778	N20501, W21595, AA971971, AI017087, AA782105, AI924135, and AC007066.
HPJBL30	2102	948721	1 - 1114	15 - 1128	AI743553, AI458005, AA855142, AI808388, AI808190, AA854848, AI167631, AI458852, AI740975, AI184926, AI027358, AI084343, AI041477, AA860979, AA782086, AI864309, AA585255, and AI035562.
HPJBK25	2103	974606	1 - 199	15 - 213	
HPJBK14	2104	974593	1 - 317	15 - 331	Z98272, and AC005202.
HPJBH45	2105	717088	1 - 391	15 - 405	H02676, R21208, and AC006480.
HPJAX30	2106	607408	1 - 748	15 - 762	
HPJAU73	2107	806718	1 - 306	15 - 320	W04456, H09371, D59238, H09370, N34243, AA091691, and N75681.
HPJAP92	2108	887830	1 - 416	15 - 430	Z97832.
HPJAO13	2109	824243	1 - 895	15 - 909	AI284640, AI801600, AA745582, AA491814, AI350211, AA745431, AI902694, AW080134, AI053672, AI133723, AW193265, AI688846, AI446464, AA492132, AA985038, AA747480, AA350859, AA318652, AI286356, AI471543, AI679045, AA649642, AI610159, AA503258, H64777, AA515435, AI761471, AI469624, T07451, AI281697, AI251002, AI205126, F25276, AA977743, AA515751, AA559290, AI281881, AW419262, AI610376, AW276435, AA678436, AA747276, AW088058, AW274349, AI648558, F29989, AI061334, AA605274, AA747472, F36273, AI962050, AI287651, AA553465, AI264743, AI344844, AI198376, AA377730, AA483034, AA650244, AA469451, AI312149, AI049634, AA745560, AI918421, AI471481, AW103981, AI937850, AA490165, AI768952, AA659083, AI367975, AA594145, F18974, AI245679, AA364224, AA365302, AA680243, AI286264, AI624698, AW440976, AA441788, T40338, AW236342, AA521323, AA557879, AA843450, AW265170, AI287964, AW029038, AL046409, F31204, F28776, F37169, H64560, AI305547, AW193432, AI339850, AI963720, T53607, AI929531, AI120483, AA347927, AA708678, AI282832, AI358571, R91994, AI904894, AW243960, AI358343, AW243698, AI184226, AW166815, AA657918, AA515051, F23279, AI045182, AI355206, AW264973, AI919029, AI431303, F33566, AW276827, AA347930, F37286, AW303196, AA886584, AA244415, AI206785, N43757, AA302963, AA482711, AA338486, AI270117, AA501722, AA229785, AI821271, AA503154, AA669840, F35673, AA557686, AI653905, N71930, AW272758, AW301350, AA358122, AA654771, F34558, AW104748, AW406755, AA664535, AA100372, AA084070, AA810318, AW265654, AA364456, AI924251, AW261871, AA682912, AW088202, H41319, T08638, AI619997, AW162049, AI832782, AI633007, Z98473, AA581903, AI358501, AA669251, AA394271, AI365988, AI569086, F28576, AI083946, AI963095, AA610491, AI866956, AI299050, F28204, T06783, AW238278, AI692265, AI802526, AI358229, AA515224, T40617, T29180, AI083998, AI119691, AA528516, AI309740, T40077, F26152, C75026, AI709365, AI133636, AI081095, AF150152, AA715609, AI567674, AC004076, AF019664, D83989, X75335, AC007446.

HPJAN69	2110	754858	1 - 346	15 - 360	AC005598, U57007, I51997, AL031680, AL008725, M87916, AP000297, X55925, U57009, U14718, U80017, AC009498, Z30979, M37551, AF015152, U18394, AP001035, X55928, X54180, U18391, U18392, U57006, U18393, U57005, U18390, AL049776, S75337, M87919, AC005546, U18399, S70697, X55924, U18398, AL035448, Z81370, AC006942, AL031118, X55932, AL023553, AC005291, AL109801, AC006205, U18395, AC006537, AC005032, AC005790, AC005335, X54181, X54178, X55931, U57008, AC006251, X54175, S70707, S70694, U02058, U02054, U02063, Z93016, AC005028, U14716, AF147277, AP000044, AB020859, AP000112, AB024685, U14719, U14713, AL031577, AC007386, AL035458, AC005284, AF077058, AC003954, U14710, AC002038, X55922, U14714, AC005019, X55926, AL031650, Z75888, U18387, X55930, AC005912, U14711, U14712, AC011198, AC005614, U95740, U14706, AP000306, AC005193, AC007298, Z94721, U14695, U14705, Z75887, U14702, U14689, U14691, U14685, U14686, U18396, AP000047, AC007370, AB023057, AC002564, U02048, AC009069, AP000520, AC005565, D26067, Z84474, M87918, U72787, AC007216, AC005251, AP000115, AC005815, AC000387, U14715, AC004020, AC004263, AC005069, D87000, U14703, S70699, AL031427, U95742, AL022154, U47924, AC008115, AB020668, S77605, AF055066, AF015156, AC006208, X54179, U14699, U14687, U14688, U14692, AP000553, AL139054, AC009516, AC004964, AC006211, AC004193, AC004659, AC008071, AL132992, AC002404, AC004957, U62292, AC001164, AP000567, D89870, A39972, AC002544, Z85987, AL133404, Z92845, AC005250, AC008079, AF139813, Z82195, U14717, AL034553, AL110120, AL031714, AC006285, AC004990, AC005592, AL031054, AL035209, AC006336, AL023513, U67221, X54177, AL035450, AC007012, AP001172, AL050318, AC004453, AC006204, AC004854, Z98744, AC005838, AC004813, AC004019, U18400, AF015160, Z84814, AC004637, AL031602, AC005360, AC004765, U63721, AC003982, AF015153, Z98043, AC004878, AC006152, AC005360, AC004765, U63721, AC003982, AC004187, AC006511, AC005071, AL034549, AC006207, AC005104, U14700, AC010436, AC005993, AC004152, AL021546, U14690, AL049633, AC004890, Z31005, Z82208, AF015155, AP000252, AL133399, AC005670, AC007312, AC007243, AC008101, AC007043, U73684, AL021977, AC004477, AL121603, AC007617, Z75746, U34879, U91326, AL034548, and AL049781.
HPJAN67	2111	751384	1 - 308	15 - 322	AA961913, AI088134, AW263056, AI923972, AW205741, W19869, AC004962, and AL049431.
HPJAN57	2112	734503	1 - 239	15 - 253	AL133246.
HPJAJ20	2113	669000	1 - 754	15 - 768	R11971.
HPJAE51	2114	725761	1 - 564	15 - 578	H16572, AW241811, H18666, AW241812, AW129128, AW009414, AA553981, AA876116, AI243349, AA757971, AL035696, AC004842, AF020802, AP000687, AJ229041, AL035252,

HPJAA27	2115	419786	1 - 348	15 - 362	AC005908, AL009179, and AL022324.
HPICG93	2116	887817	1 - 434	15 - 448	E17067, and E17068.
HPICE06	2117	935095	1 - 804	15 - 818	H97402, R51737, N69864, and N24204.
HPIBY36	2118	708183	1 - 504	15 - 518	H08396, R25790, N53251, N51204, Z42071, and AP001115.
HPIBT62	2119	743135	1 - 475	15 - 489	R23515, N76536, T74959, F12749, A1961429, F11571, and AA640294.
HPIBO89	2120	786741	1 - 459	15 - 473	H96715, W90749, R49610, AA983768, AA904877, AA677746, R38813, and AL133095.
HPIBI89	2121	867845	1 - 426	15 - 440	R99003.
HPIBH31	2122	838809	1 - 428	15 - 442	H73369, N34255, AW160399, H79944, AW239079, AA132425, R20300, H73299, N30499, AW407963, H70394, R97376, W52852, AA182911, AW407596, AA302225, N43927, W19497, T70776, W31972, N42142, T85051, N23533, AA093843, AA305409, AA312807, AA045678, W80575, AA326688, A1245848, AA035464, AA329750, AA229940, AW175673, W07289, AA332809, A1631124, AA372693, R07414, AW407906, R57473, AA299454, AA455701, N55991, AA230126, H03161, AA223846, AW205900, H96200, AA364785, AA467792, AA035465, AA307572, AA024761, C00198, W76420, AA176320, AA120782, A1719711, A1719084, A1453530, AW162019, AW173349, A1984009, A1088520, AA639784, AA127810, and AL024498.
HPIBC93	2123	785971	1 - 426	15 - 440	AI814342, AW001123, A1924201, A1935359, AA888820, A1366738, AA665651, AW134874, AA252373, AA766826, A1198343, AA670436, H42655, H62371, A1763375, Z97630, AF077740, Z79834, Z79925, Z58542, and Z58541.
HPIBB45	2124	867850	1 - 165	15 - 179	
HPIBB43	2125	715037	1 - 234	15 - 248	
HPIBB32	2126	698901	1 - 172	15 - 186	AL021366, and AL050332.
HPIBB19	2127	668489	1 - 405	15 - 419	
HPIAW91	2128	790033	1 - 713	15 - 727	AI690139, AI697496, N91409, N69381, A1695286, AC004200, AP000519, AB023056, and AF055066.
HPIAV06	2129	935111	1 - 373	15 - 387	AA600329, AI061271, A1609972, AA573000, AA551268, A1580707, AA665532, A1306717, AL138199, AA502207, AA302661, AA295865, AA295874, AA838091, AA378489, AA779783, T40629, AA601343, AA577824, AA665187, A1520967, A1452836, AA526424, AA553579, H25938, AA599080, A1417586, H47201, AA318116, AW084173, AL037777, AA349606, AA320521, C16718, N94325, AW236288, A1494417, R70884, AA099840, AL137946, A1921706, AA172191, AA349937, AL041375, A1719523, A1819391, AA262752, AA009855, AA551400, AA468196, A1932900, AA552966, A1570943, N91711, AA468247, AA810154, AA552202, AA137274, AL042373, A1889579, AA659656, T94140, N75708, Z97353, AC007707, Z98941, AL034429, AL109984, AL132642, AL035685, AC007934, AP001038, AB023048, AL035106, AC022517, AC004259, AC004967, AL132987, AL021395, AL035457,

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HP1AQ70	2130	973604	1 - 507	15 - 521	AL043020, T66111, T74122, R53143, R20480, R05568, F12380, H05013, and Z92544.
HP1AP79	2131	774817	1 - 499	15 - 513	AA601278, A1791227, AL121287, AW069227, AL307201, AW168433, AA578621, AA587516, AW404225, AA832145, A1285578, A1309943, A1634187, A1590404, T08386, A1890794.
HP1AD10	2132	906987	1 - 1270	15 - 1284	AC005233, AL031983, AC003999, AL021026, AC006137, AC007182, AC007298, AC007685, AL079342, Z82188, AL118497, Z92547, Z68756, AP000322, AL021978, AP000121, AL021154, AC003010, AF109907, AC004887, AC003964, AL031767, AC006210, AC007388, AP000053,

HPHSB91	2133	790313	1 - 307	15 - 321	AP000168, AL021393, AP000362, AP000281, AC004785, AC007425, Z97205, U91328, AC004216, AR036572, AB020863, AB020868, AC003697, AC008064, AF001552, AC004858, AC004125, AL050307, AC004897, AC005057, Z93244, AC004106, AC000029, AC005228, AP000040, AP000108, AC002390, Z84467, AF152365, AL035414, AC005295, AC004455, AP007327, AC005839, AC005011, AL035608, AC007240, AC004974, AL049712, AC006116, Z86090, AL096776, AC004388, AC005482, AC005181, U95740, AP000338, AC007284, AC005252, Z68192, AC005184, AC007406, U62293, AP000216, AL034402, AF117829, AL024507, AC008040, AL022163, AL031293, AP000432, AC005291, AC005730, AC005971, AC005331, AC007263, AC004003, AL132992, AB023050, AC004844, AC004832, AL079304, AL035089, AC003006, U91318, AC005588, AL021918, AC003101, AL132774, AC005618, AC004817, AL022578, AC006032, AC005953, AC002375, AP001053, AC006167, Z95704, AF196970, AL109967, AP000511, AC006257, AC009399, AL078602, AC005027, AL031280, AL021807, AC004859, AC005838, AC009498, AC004702, AL133404, AC002394, AL139054, AL031653, Z97055, AF015416, AC006480, AC007114, AP000144, AL035420, AC009946, AL136168, AL049869, AC005102, AC006536, AC006509, AL031665, AC006277, AL109847, AC005881, AC003046, AF111169, AL133241, AC004087, AC005411, AC005036, AC004797, Z84480, AC005874, AF134471, AP000353, Z95115, AP000043, AP000111, AF002993, AC002123, AL050306, AC005534, AC006059, AC004525, AC005993, AC007546, AC004104, AC004605, AC005029, AL133304, AC005609, AC010206, AC002531, AC007656, AC002464, Z95116, AC005401, AC005013, AC003037, AC007462, AP000140, AL009051, AP000509, AC004185, AP001058, AL022237, AP000088, AC006484, AC004910, L47334, U91325, AC004975, AC005028, AL117258, AF172277, AC006075, AC004067, AC007225, D84394, AC006387, AC005049, AC004921, AL110503, AL121877, AC005799, AC005050, AC004825, AC005535, AC004838, U52112, AC004964, AP000431, AL022396, AC007541, AC007028, AL133355, AL049872, and AC004690.
HPHSB21	2134	671118	1 - 401	15 - 415	
HPHSA94	2135	793084	1 - 196	15 - 210	
HPHAE81	2136	778036	1 - 404	15 - 418	AI674979, AI493794, AI261833, AI478181, AW300149, AI769515, AI373263, R07018, AI672274, AW301213, AW301193, AA910740, AJ249199, and AF141289.
HPFMG06	2137	933696	1 - 209	15 - 223	AA165204.
HPFMB10	2138	961758	1 - 670	15 - 684	AA548727, Z28355, AI557262, AA585439, Z30131, AI557731, AI535639, AA585101, AI525306, AI557238, AI525556, AI536138, AI557807, AI541307, AI526194, AI541205, AI541365, D61254, T11028, AA585453, AI546945, AI525316, AI541415, AI541535, AI547039, AI546999, R28735, C16300, AI535813, AI535660, AI541374, D57491, AI541390, AI541013, AI557787, AI525431, R29445, AI541510, AL041346, AL041096, AL047012, AL041358.

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HPFDX38	2139	709302	1 - 571	15 - 585	AA649151, AA251443, AW080521, AJ261734, and AA761257.
HPFCZ82	2140	780198	1 - 509	15 - 523	W73400, W73375, AA550828, AF086321, and AC008042.
HPFCZ60	2141	430125	1 - 477	15 - 491	N27955.
HPFCZ10	2142	968360	1 - 308	15 - 322	
HPFCR23	2143	675120	1 - 432	15 - 446	
HPFCP82	2144	867881	1 - 675	15 - 689	H01127, and AI696650.
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HPFCP53	2145	526574	1 - 487	15 - 501	H66573, AA381762, A1689019, H54210, AA563770, AA664604, A1244254, AW021116, A1500552, AA130647, AA879053, A1275183, AA669706, H64777, AA367788, AA468486, AA604843, A1588856-N45421, AA573213, H93293, AA310557, A1004591, F02412, A1623563, A1270476, AW168483, T08421, A1309384, AA448838, A1803809, N67387, H55894, AA837715, A1471691, AA298386, AA599495, A1473701, A1279759, AA904275, A1627581, F02421, A1440324, A1598060, A1754291, R92640, A1471572, T03203, AA574286, A1357551, A1885572, AW189353, AA650447, AW168479, A1271762, A1305258, A1360514, A1609223, A1046746, AA669709, A1687962, N38789, A1076236, AA847099, A1821044, AA669102, AA487542, AA679872, AA491484, AA077776, F17700, AA086318, A1561116, AA378683, AA558344, M78007, AA365586, AW079809, AA613627, A1889579, W95503, T94116, H96518, AW270256, AW404844, H44786, A1915081, AA664283, AL045709, AA640979, AC012627,

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HPFCM45	2146	723501	1 - 537	15 - 551	H14121, AL1375113, AA744592, AA960851, AL298360, AW293609, AW386311, AW386307, AW379359, and AW386340.
HPFCM27	2147	682098	1 - 537	15 - 551	AI126345, N75862, and N22068.
HPFCL56	2148	732601	1 - 343	15 - 357	AA424616, AW206710, W48815, and AA284281.
HPFCL24	2149	867889	1 - 321	15 - 335	AI741779, AI203371, AA464709, AA725428, AA771747, U25770, and AA725175.
HPFCG02	2150	921196	1 - 376	15 - 390	H66442, and AC005484.

HPFCA01	2151	928672	1 - 412	15 - 426	T95327, AI823904, AW206324, T95680, AI369869, AI939557, and AC005531.
HPELD12	2152	969248	1 - 671	15 - 685	AI801883, AA782908, AA026115, and AA770002.
HPEKI04	2153	926104	1 - 413	15 - 427	T77896, T77813, and AA009652.
HPEKE01	2154	914414	1 - 521	15 - 535	AA977210, AI589896, AI198170, and AI557234.
HPEBT82	2155	524246	1 - 146	15 - 160	AL040143, AA747480, C06327, AA747276, AI888365, AA502103, AA132553, AW303196, AW301350, AA310158, AW274349, AL079433, AI865364, AA747375, AI537185, AI890348, AA828704, AI434706, AI536146, AI370475, AL042420, AI306028, AC004972, AL132987, AC006017, AC004812, AC007226, AL031721, AF196779, AC002553, AL034429, AC006057, AC006965, AP001051, AC006449, AC003043, AL031650, Z83849, AC007064, AL133245, AC006160, AC006277, AC004884, AC002558, AL031602, AL132992, AL035361, AC005233, AP000556, Z98200, AC007052, AC002429, AC007546, AC018633, AC005844, L44140, AL050341, U66059, AC005250, AC002492, Z99716, AC004585, AC004028, AL021939, Z83840, AC007878, AL049757, AC005562, AL031848, AC005695, AC005324, AC007773, AC003957, AC005548, AL049776, AC008039, AC006548, AC003037, AC002485, AC005321, AC005231, AC005771, AF111167, AL049872, AP000111, AL035460, AP000961, AL133297, AL031662, AC009247, AC016025, AC005412, AC002301, AC002041, AC000081, AC007536, AL023803, AC004861, AP000557, AC009516, AC004466, AC005358, AC008045, AL008718, AL031280, Y14768, AF117829, AC007686, AC004149, AC004217, AC005971, AC003007, AB003151, AC004647, AC004150, AP000505, Z86090, AC008372, AC006362, AC002316, AC005759, AJ003147, AC002404, AC005566, AC004890, AP000501, AL133289, AC010077, AC007040, AL022329, AL022397, AF196969, AC006039, AL121603, AL023577, Z82244, Z97196, AC005632, AC005808, AC007421, AC006285, AP000344, AC009479, AC005037, AC007537, AC000353, AC005089, AL031123, AC004460, AC004913, AC004019, AP000018, AC000003, AL133163, Z95115, AC006486, and AC007227.
HPEBT78	2156	773844	1 - 136	15 - 150	AW339853, AW188119, AI991660, AI369596, AI494519, and N39086.
HPEBT68	2157	753692	1 - 233	15 - 247	T40308, AA584201, AI732378, AI872020, AW327868, AA679936, AL042853, AA847952, AA828749, AA581903, AI270559, AA478355, AL119691, AA515549, AI580250, AI963720, AW265385, AA531186, AW274349, AW002350, AA580808, AI457397, AA618452, AA503600, AI284640, AI696962, AA640410, AA640430, AI908730, AA847499, AA015846, AA682912, AI783581, AI345518, AA806796, AI754955, AW131208, AI583283, AL046409, AI358571, AL121336, AA610688, AI369580, AI732120, AW303196, AA658362, AW022406, AW264934, AA503475, AW419262, AW088846, AA631480, AI677645, AI589230, AL043719, AA623002, AI632991, AL046457, AA680243, AW301350, AA613203, AI521062, AW075511, AI350211, AA720702, AI568678, AL036037, AA483256, AL121235, AA812281, AA532700, AA491284, AA846952, AA724333, AA533303, AI431303, AI471887, AA493708, AF034184, AI570261, AW023149, AI754253, AW157608, AI745325, AA358409, AL041146, AA491814,

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HPEBT54	2158	731002	1 - 385	15 - 399	
HPEBT49	2159	530021	1 - 372	15 - 386	AC005089, AC005940, U91323, AC005666, AC007546, and AC003093.
HPEBT34	2160	706836	1 - 358	15 - 372	
HPEBT14	2161	535061	1 - 235	15 - 249	AW179046, AL133500, and AC003071.
HPEBT07	2162	954214	1 - 303	15 - 317	AC002351, AC005875, AL022326, and AC006312.

HPEBO67	2163	578516	1 - 216	15 - 230	H78283, AI127890, AW090182, AW001838, W72897, and AF086351.
HPEBL08	2164	960240	1 - 408	15 - 422	AI021894, AI359246, AI422145, AI800895, AI689642, T89411, and AC007684.
HPEBH01	2165	921767	1 - 333	15 - 347	AA019103.
HPEBG89	2166	785942	1 - 505	15 - 519	AA425851, and AA425691.
HPEBG10	2167	867888	1 - 271	15 - 285	AA533740, and AI984425.
HPEBA89	2168	910250	1 - 490	15 - 504	AA758474.
HPEBA61	2169	742251	1 - 74	15 - 88	AC007036.
HPEBA05	2170	928027	1 - 357	15 - 371	AI217338.
HPEAG43	2171	468542	1 - 485	15 - 499	AA634147, AA837087, N63746, AC006197, AL031311, AC006079, AL035555, AC004790, AL031670, AL022727, AC002457, AL096803, AL049874, Z98048, AC005881, AC003663, and AE000659.
HPEAD72	2172	761472	1 - 371	15 - 385	H24817.
HPEAB12	2173	968847	1 - 498	15 - 512	AI656658, AI991597, AI962317, AW204277, and AI963904.
HPEAA57	2174	514231	1 - 441	15 - 455	AC008039.
HPEAA40	2175	867899	1 - 332	15 - 346	AA879011.
HPDWR11	2176	965249	1 - 629	15 - 643	AI694423, AA773635, AA443144, AA443143, AI918138, AW206226, AI337165, AI350411, N80841, W07349, AW197541, and AW138024.
HPDWN05	2177	928563	1 - 478	15 - 492	AI627858, AI674644, AI521975, AA653609, AA447670, R37708, H18650, and F34959.
HPDVM01	2178	913859	1 - 454	15 - 468	AA905449, AA969031, U62317, and AC005859.
HPDVD11	2179	965276	1 - 293	15 - 307	AI809869, and AA918215.
HPDRU11	2180	965307	1 - 346	15 - 360	N52071.
HPDRR06	2181	968601	1 - 436	15 - 450	AA806114, AW242125, AI249498, AI560615, AI274667, AI972210, Z28533, and AW361342.
HPDRN07	2182	951838	1 - 601	15 - 615	AI365618, AA197089, AW023975, AI570067, AW008217, H05066, AI828721, AI620666, H24331, AI684999, AA205931, AA601336, AI572680, AI921744, AI890297, AW338376, AI619994, AA171400, AI281622, AI174489, AA218684, AA878350, AA523812, AA579082, AI821342, AA935827, AW337817, AI860423, AW020102, AW021674, AW275432, AI889177, AA084320, AI798521, AA847341, AA507499, AA112864, AI434103, AA610644, AA557945, AA584241, AI819419, AI249365, H79277, AI000314, AA720582, AA493245, AA227713, AW157128, AA636077, AI254267, AI567676, AI538404, AI862716, AA135761, AI733523, AW021917, AA584489, AI969090, AI872229, AI813920, AW129188, AA629668, AL044966, AI038029, R64110, AI755214, AI754567, AI925588, R79396, AI114755, AA669238, AI734076, AA809546, AA733089, N99245, AI174827, W44797, AI857834, H47461, AI609992, N27340, AA618531, AA814719, AW149241, AW340905, AA826109, AA779599, AA598608, AA554289, AW028376, AA550989, AI148840, AW192930, AW069769, AI754105, C75332, AI439525, AI307563, AI049845, AA280886, AI135490, AA112646, AW023111, AI201983,

AA225141, AW277240, AW439224, AI123488, AW021847, N49298, AA525156, AW085626, AW162762, AA570255, AA834891, W69639, AA522864, AI803824, AA129000, AI003391, AA364147, AI282479, AI754926, AA573564, AL044701, AW189853, AA657808, AA182928, H54601, AA167656, M77888, T50676, F35684, AA702637, AA969564, W02419, AA342029, AW237905, AI791659, RG1887, AA086042, AI732690, AI890857, AI732327, AA635150, AI815210, AI926876, N66744, AI459879, AI370470, AW083966, AI754257, AI932871, AA492496, R67038, AI587213, AA488419, AA714011, H59856, AI734075, AA772493, AA904211, AA633804, AW243817, AW070901, AI934664, AW419227, AA862312, AI446574, AI249688, AI921765, AW085811, AA100107, F3221, AA503298, AA640305, AI523356, AA470490, AA828840, AA653291, AA483606, AI537020, AC004263, AC006947, AP000359, AC005327, Z83844, AC007686, AC007055, AC006530, AC005015, AL049553, AF207955, AC006441, AL049780, AC004228, AC007540, AL035417, Y10196, AC001228, AP000510, AC005043, AL049709, AL034423, AC007030, AF195658, AC005081, Z97196, AL139054, AC007066, AC005519, Z99716, AL031587, AL136295, AC007308, AC006039, AC005529, AC007695, AL133246, AL020998, AC005412, AF111169, Z98044, AL049569, AC004999, AC005702, AC006241, AC004882, AL031291, AL031651, AL121657, AL021937, AC006312, AC004938, Z85987, AC004707, AC005180, Z82184, AL022165, AC004150, AC002352, AC004770, AC002470, AC004963, Z93241, AC004851, Z70289, AL031055, AC002310, AC005668, AC010200, AL035588, AC004974, AC004841, AL049776, AC006449, AC005280, U91321, AF001549, AC004477, AC002115, U91318, AL022312, Z99774, AC003025, AL034548, AC004973, AC005684, AC007227, Z93017, AC007151, AC004811, U91326, AC004605, AC005031, AC012384, AL031985, AF095725, AC000065, AF139813, AC006055, AL022314, AL031005, AC007207, U80017, Z98051, AL022330, AC005815, AC005005, AF207550, AC002347, AC004787, AL031284, AL035458, AC000025, AC006561, AC002544, AL022097, AC004797, AF196779, AC005377, AL117694, AL009181, AL121754, AL096712, M89651, AC005932, Z48051, AF047825, AC005838, AC007773, AC004032, AC005874, AF134471, Z98949, AP000501, AC005320, AL031664, AL035071, AB023049, Y18000, AC004832, AC007955, AC007917, AB023060, AC006581, U95739, AL035089, AC004169, AL031667, AC004825, AC004531, Z95115, AL034420, AC006511, AL031295, AC006560, AL031053, AF111167, AC005696, AC005220, AC005375, AC002059, AC006057, AL035422, AC003101, AL080312, AL109839, AC007225, AL049829, AL109984, AC004820, AP000558, AC005520, AL080243, AL008718, AC003104, AC004686, AL109627, AL133546, AL031666, Z95118, AL049872, AL050318, AC006162, AJ251973, U78027, AC004230, AC004887, AC002400, AC007011, AC006229, AC006450, AC004883, AC002375, AC004000, AF196971, AC005871, AE000658, AC002316, AC002369, Z97055, AC007016, AC006942, AP000555, AC004417, AL035461, AC004216, AL135960, AJ131016, AC007041, AL034554, AC003043,					
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HPDRG01	2183	914416	1 - 757	15 - 771		AW182845, R06052, AL342212, R05947, and Z61625.
HPDPS12	2184	969342	1 - 448	15 - 462		AA703816, AA258655, and AW173253.
HPDPP12	2185	969341	1 - 466	15 - 480		AA491958.
HPDPC08	2186	957822	1 - 443	15 - 457		AL043010.
HPDOW10	2187	961782	1 - 430	15 - 444		AI301598, AA889756, AA279491, AI301605, AA721450, and AL020997.
HPDOO10	2188	961881	1 - 754	15 - 768		AI939627, AI199438, AI498865, Z99396, AW392670, AL036418, AL038837, AL037051, AL036725, AW384394, AL036858, AA631969, AW372827, AL119443, AW363220, AL119497, AL119483, AL039074, AL119319, AL119355, AL119457, AL119324, AL036924, U46349, AL119484, AL119363, AL119391, U46350, AL119522, U46341, U46351, AL119341, AL038509, AL119418, AL119335, AL039564, AL119396, AL039085, AL039156, AL039108, AL039109, AL039128, AL119496, U46347, AL037639, AL119444, AL134531, AL037094, AL039659, AL036196, AL036190, AL037205, AI142137, AL119439, U46346, AL042984, AL037526, AL134538, AL037085, AL038531, AL042614, AL036767, AL043029, AL037082, AL037077, AL036268, AL119399, AL042965, AL042975, AL134527, U46345, AL039625, AL039648, AL045337, AL038520, AL119488, AL042542, AL036238, AL038851, AL043019, AL042551, AL043033, AL038447, AL043011, AL042544, AL039678, AL039629, AL042450, AL039386, AL037615, AL043003, AL119464, AL036733, AL037027, AL037178, AL036774, AL036719, AL036998, AL039410, AL036679, AL036886, AL036765, AL036191, AL036158, AR060234, AR066494, A81671, AR023813, AR064707, AR069079, AB026436, and AR054110.
HPDOF11	2189	965491	1 - 870	15 - 884		AI939537, AI363373, and AL021997.
HPCTK02	2190	917480	1 - 434	15 - 448		N24908, AI916992, and N49979.
HPCTD03	2191	922149	1 - 361	15 - 375		AF150341, AI767747, AI972527, N85789, AI637774, AC001555, L81893, AC006077, and L81892.
HPCTC04	2192	925777	1 - 485	15 - 499		AI635931, AW241388, AI360647, AI218091, AI868064, AI824561, AC006198, and AL079338.
HPCCQ07	2193	951646	1 - 399	15 - 413		AI350228, AI792022, R20916, AI701465, AI457852, AI261722, AI741246, AF017104, and AC016831.
HPCPM63	2194	954940	1 - 483	15 - 497		AI131455, and AI761541.
HPCOV68	2195	911075	1 - 578	15 - 592		AA604716, R49364, and AC004500.
HPCAO89	2196	946913	1 - 464	15 - 478		
HPCAK66	2197	320415	1 - 331	15 - 345		

HPCAG81	2198	778177	1 - 388	15 - 402	R33353, AA482623, and AW237518.
HPCAF65	2199	573368	1 - 410	15 - 424	AW023975, AA610255, AA847622, AI223968, AA599080, AA132912, AA358086, AA736713, AI066711, H71678, AA744094, AA744048, AA551268, AA282951, AW151761, AA557945, AI537020, AL045476, AA515728, AI828721, AI025930, AI925065, AI823705, H12857, AW245354, AA856866, AI824476, W02497, AI46259, AI590404, AW104163, AW440368, N41775, AA984829, AA779783, AA847047, H40324, AA719523, AI078409, AI973173, AW088631, AA993636, AI636734, N90460, AI816537, AW129188, AA664604, AI471467, AI421755, T07327, AI282479, AI307563, AA747375, AC005484, AC002310, AC007376, AC006966, AC005913, AC002303, AL121769, AL031427, AF045555, AC006125, AC004522, AC006130, AL031657, AC005081, AL079295, AL049829, AF207550, AL031846, AC002418, AC004859, AC007371, AF196779, AL031431, AC004662, AC004386, AC004882, AC005225, AC002504, Z83844, AC005529, AL121653, Z97056, AC005695, AC004491, AC004813, Z98884, AC005972, Z68870, L44140, AC003108, Z98200, Z85987, AC005520, U82668, AL035658, AC001234, AC006449, AC005598, AL034400, AL031228, AL033584, AC007842, AL136295, AC004686, D86995, AC007227, AC007327, AC003010, AC000353, AC000025, AC005046, AC004834, AL132777, D87675, AC002302, AC002551, AC002128, AL109963, AL022476, AC007129, U91321, AL031276, Z98048, AC009501, AL135960, AJ131016, AC009542, AL008629, AF109907, AC004895, AC004477, AC002492, AL121603, AC005412, AL132987, AF134726, AC004876, AC005546, AC007664, AC007541, AP000011, AP000152, AC006088, AL049694, AC007766, AC004881, AC007358, AC002126, AC007216, AL031311, AC004134, AC005940, AC005971, AC005089, AC004099, AC003101, AC005277, AC007308, AC007551, AL049872, U78027, AL031283, AL078593, AC002470, AL022322, AC006064, AF011889, AC007565, AL135744, AL109613, AC005696, AC005383, AC007536, AL031230, AC005730, AL008735, AC004975, AL133448, AC009330, AC004851, AC007681, AC005821, AL034429, AC005736, AC004821, AC002425, AC003682, AC005666, AC007226, AC000134, U52112, AC002400, AC007193, AC008044, AC007283, AC006057, AC005531, AL031005, AF031075, AC004144, AC005015, AC006285, AL049757, AL022396, Z83843, AL096791, AL033527, AC002721, AP000048, AC006333, AL022165, AC006487, AL031287, AC004792, U62293, AC007263, U63721, Z83822, AC007999, AF017104, AC008015, U96629, AL024509, AC007298, AF111167, AC005519, AC002059, AP000115, AP000212, AP000134, AC006552, AC005537, AC004382, AF030876, AC005562, AC004596, AC005280, AC007546, AC002350, AL078611, AC006026, Z96776, AF030453, AC006241, AC016830, AL078476, AL021154, Z95115, AC004832, AL049539, AC004655, AL109623, AP000553, AC006006, AC006530, AC003043, AC007160, AL049748, AC005363, AC005527, AC006505, U10087, AC005071, AL078581, AL109758, AC006146, AC005486, AC016025, AJ009610, Z82180, AL035422, AC005082, AR036572, U91328, U91323, AL109627, AC005839, AL080250, AC005261.

HPCAD17	2200	584754	1 - 1073	15 - 1087	AL133382, AC009181, AC000082, AP001060, AP000010, and AC002347.
HPCAB54	2201	728857	1 - 395	15 - 409	
HPCAB45	2202	575233	1 - 233	15 - 247	AA112321.
HOVEV01	2203	914553	1 - 721	15 - 735	AI042120, AI520690, AI346542, R80717, N70361, H97746, AA678405, T48628, T95511, R50705, AI678296, R99146, AA973947, AW392739, AL046192, W05002, AW138135, R50704, AW371372, AI620712, AI350513, AI423566, AI342100, R80716, D79458, AA933894, T95510, AA622588, T48627, AW392719, AA781834, AA258040, AL040243, AI684279, AI537677, AW104724, AI624279, AI564719, AL119748, AI815232, D79367, AI567940, AI254731, AW132056, AI445025, AI648509, AI491852, AL045266, AI537024, AL049085, AI500706, AI922901, AI499463, AW262565, AI269862, AI275175, AI802542, AI677796, AI433976, AL045500, AI433157, AL043326, AI500523, AI539771, AL134830, AI619502, AI335449, AI500659, AI491776, AI648663, AI520785, AI536638, AI702068, AI801766, AI269205, AI811344, AW087445, AI637584, AI284484, AI559296, AI591316, AI554427, AI890833, AI926790, AW026882, AW148408, AW071349, AW301409, AI445237, AW151138, AL079977, AI610402, AW198090, AI921248, AI702073, AW004685, AI573032, AI446628, AW087207, AI682971, AW088793, AI868831, AI624206, AI702406, AI571909, AI475451, AW162071, AI287489, AW150578, AI654276, AI889376, AI620284, AI524671, AW129659, AL079963, AW169671, AI560099, AI468872, AL036361, AI440239, AI815855, AW090013, AI249257, AI590999, AI866608, AI568296, AI538716, AI432969, AI439745, AA225339, AI349004, AI872711, AI828731, AI569583, AI499393, AI871697, AI273048, AW268220, AI520862, AL047763, AI828682, AI250293, AI590227, AL043981, AI696612, AI824746, AW274192, AI572676, AI583065, AI584140, AL041150, AI536685, AI436456, AW020561, AI538259, AI570909, AI499131, AW082113, AA835801, AI567846, AI567993, AI432656, AI475371, AL121328, AI431975, AW403717, AW073270, AW168795, AI857296, AI701074, AI612913, AI625079, AW148363, AI627360, AL042551, AI540832, AI863014, AW149869, AI567128, AI635461, AI274508, AI499512, AW080327, AI889133, AI445432, AW075667, AI284517, AI434223, AI859511, AI590118, AI538829, AI654750, AW167924, AI538218, AI687362, AW148716, AI862144, AL119791, AW082040, AL042628, AI679990, AI913437, AL121270, AI886124, AI687728, AI590021, AW301505, AI224992, AI349598, AW170635, AI784252, AI697137, AI682841, AI610756, AI521012, AI801608, AI819326, AI590120, AI499285, AI521040, AI679321, AW086113, AW118398, AW103371, AW008048, AL042745, AI274013, AL036736, AI633419, AW166903, AI064830, AI862139, AI801322, AI539780, AI690426, AI630928, AI289937, AW169653, AI610645, AI801325, AI636445, AI634345, AI818683, AI609580, AI364788, AI500146, AI280637, AI884469, AI434281, AI569616, AC007860, I48979, I89947, I48978, S68736, AL050149, AF090901, AL110196, AL133080, A08916,

					AL117460, AL110221, AF113019, Y11254, I89931, AL122050, A08913, AF118070, AF090934, AF078844, AF113676, AL050138, AL122123, E07361, X84990, AF113677, AF158248, X82434, AL137557, AJ000937, AL133640, AF111851, AL050116, X63574, AL122121, AF106862, Y16645, AF118094, S78214, AF017152, AL049314, AL137283, A65341, AL080124, AL133075, AF104032, E03348, AF113689, AF113694, Y11587, AL133016, AB019565, AF090900, AL049452, AL080060, AL117457, AL050108, AF090896, AL137527, AF090903, AF125949, AF090943, AL137459, AL133557, AL096744, AL050393, AF079765, A93016, AF113691, AF113699, I49625, AL137550, AL133013, AJ242859, L31396, AF091084, AF146568, AL133565, AF113690, AL049938, AF113013, AL133093, AL080137, AL050146, AL117394, L31397, AF125948, AF017437, AF118064, AL133093, AL049430, AC002086, U91329, AF097996, AL133606, AL110225, AL049466, AL049382, AL049430, AL133560, AL117585, A58524, A58523, E02349, AJ238278, AL137550, AR011880, A08910, AL133560, AL117585, A58524, A58523, AL049464, AF177401, AL122098, E07108, AL122049, AL049300, Z82022, AL034402, AL117583, AF067728, A08912, AF183393, U00763, U35846, A77033, A77035, I03321, AL117435, A08909, AL050024, AL137271, X72889, AL137463, I33392, AL133113, X70685, AL022165, AL133568, AL137648, X65873, AL122110, AL049283, AL137560, AL137538, A03736, U72620, X96540, X93495, A12297, AL080159, U80742, X98834, I09360, AL080127, AJ012755, AF087943, U67958, AL133072, AL110197, AF061943, E08263, E08264, AF000145, AF153205, AL137523, S61953, AC006336, AL133104, AL050172, X53587, I42402, AL137521, Y09972, AL133014, AF111112, AL122111, AC002464, AC005940, E15569, AL133077, AF119337, A93350, I26207, I66342, AF026816, AL137526, I17767, AC008394, AF026124, AC006371, AF079763, AL137556, AF095901, AC004383, U68387, A08911, Z37987, Y14314, I00734, E00617, E00717, E00778, AR000496, U39656, AF185576, AL122118, AR054984, AR038969, M30514, AL137476, AL133067, and AF057300.
HOVEU10	2204	961865	1 - 595	15 - 609	Z99396, AW392670, U46351, AL042450, AL043019, AL043033, U46341, U46350, AL119324, AL043008, AL119457, AL119335, AL042989, AL119401, AL134536, U46347, AL043029, AL134525, AL042614, AL043003, AL134531, and AR066494.
HOVEU06	2205	933737	1 - 324	15 - 338	W24148.
HOVEO04	2206	926209	1 - 165	15 - 179	
HOVEE20	2207	909030	1 - 432	15 - 446	
HOVDD82	2208	948619	1 - 514	15 - 528	N77523, AW371758, AA295628, AF150239, AA351493, and AF161544.
					AA814916, Z99396, AL036858, AL119319, AW392670, AL036924, AL036418, AL038837, AA631969, AL119443, AL037051, AL036725, AL037094, AW372827, AW384394, AL119497, AW363220, U46349, U46341, AL119341, AL037085, AL119483, AL039074, AL037639, AL119335, U46350, AL036196, AL037082, AL119457, AL119324, AL037077, U46345, AL119484, AL119363, AL119391, AL119355, U46346, AL134920, AL119522, AL119396, AL119418, AL042975, U46347, AL038509, AL119444, AL119496, AL039564,

					AL039085, AL039156, AL134533, AL042965, AL039108, AL039109, AL039128, AL042433, AL042614, AL119464, AL119439, AL119399, AL134902, AL042984, AL037615, AL036268, AL134531, AL142131, AL036190, AL037526, AL134538, AL042551, AL036733, AL038520, AL043019, AL042970, AL038531, AL134529, AL042450, AL036767, AL043029, AL042544, AL042542, AL119488, AL036238, AL038851, AL043003, AL036998, AL037178, AL037027, AL036679, AL036191, AR060234, AR066494, A81671, AR023813, AR064707, AR069079, AB026436, and AR054110.
HOVDD10	2209	961887	1 - 391	15 - 405	N43177.
HOVCP77	2210	772210	1 - 604	15 - 618	R41728, H24352, R39867, R60774, F10382, R59965, R45695, Z38252, R42431, D81791, R45265, and F01387.
HOVCO50	2211	932544	1 - 572	15 - 586	AW235624, A1703030, W56086, AA442067, AA460968, AA478475, AA830981, AA767533, and A1193242.
HOVCN57	2212	734779	1 - 455	15 - 469	H44610.
HOVCM77	2213	772208	1 - 429	15 - 443	R61245, AP000495, and AC002076.
HOVCM03	2214	924196	1 - 304	15 - 318	A1193258.
HOVC189	2215	786917	1 - 321	15 - 335	AA436552, A1280208, AA885577, A1692637, A1435485, and Z99289.
HOVC108	2216	959470	1 - 1020	15 - 1034	AA634064, AW082209, AA781620, R50614, R53385, A1991409, AA035741, H39673, Z59735, Z54887, Z54886, and Z65048.
HOVCD33	2217	702445	1 - 315	15 - 329	R44210, and AL040454.
HOVCC57	2218	465313	1 - 393	15 - 407	A1347543, A1004448, and T40955.
HOVBQ07	2219	858863	1 - 591	15 - 605	AA552163, AA469920, AW205550, AW341591, A1742174, A1620502, AW027003, W91950, AW026996, W91877, A1215036, A1207964, and AA523613.
HOVBK69	2220	757594	1 - 411	15 - 425	AA436185, AW052178, H96098, AA653580, and AA416482.
HOVBK38	2221	956238	1 - 663	15 - 677	A1140254, AA948324, AA251283, AA862605, A1240375, AA825275, AA999858, A1301152, A1342674, AA011200, AA815310, W58239, AA931576, A1094483, A1302269, A1202732, AA649941, A1342676, R71253, AA449275, A1383771, A1831916, A1308112, R12392, AA525847, H52934, H06918, R34144, W58328, A1695242, R71305, AA876287, W89053, N93696, AA005209, AA251692, R34143, W89107, and AC006251.
HOVBK24	2222	858857	1 - 395	15 - 409	T96953, and T72381.
HOVBI67	2223	751665	1 - 861	15 - 875	A1040113, W87283, AA700434, W87282, and AC004975.
HOVBI20	2224	669730	1 - 215	15 - 229	H80446.
HOVAZ89	2225	904818	1 - 483	15 - 497	
HOVAZ65	2226	750273	1 - 445	15 - 459	AA406496, N46132, AA406518, and H96338.
HOVAY88	2227	827077	1 - 397	15 - 411	
HOVAY58	2228	736077	1 - 472	15 - 486	H01079.

HOVAY42	2229	713812	1 - 373	15 - 387	AL139054.
HOVAY03	2230	921959	1 - 276	15 - 290	AA062554, AI869336, AW170609, H13995, AA631622, H13997, H14028, AI569586, AA632137, and AC004143.
HOVAW62	2231	745704	1 - 234	15 - 248	H57248.
HOVAO25	2232	678163	1 - 361	15 - 375	T79639, N70408, N57728, T83855, AA001363, AI078086, T93794, and W03748.
HOVAN51	2233	725005	1 - 535	15 - 549	H26739, AI668579, AI733528, and AL020995.
HOVAJ07	2234	953422	1 - 438	15 - 452	AI031837, AI985078, T75928, AC003692, AL121973, AC004019, AL049766, and AL121603.
HOVAJ05	2235	932093	1 - 453	15 - 467	AA828882, and AA829114.
HOVAF07	2236	953553	1 - 151	15 - 165	AI252937, N74027, AA836182, AW338228, AI744524, AA910108, AA772555, AI027046, AI823533, F02523, AI823535, AW102980, AA745302, AI371165, AW002825, AA887470, AF001549, AP000502, AC004651, AC002996, U91318, AF134726, AF053356, AC000353, AL023575, AC004820, AP000113, AP000045, AC004985, AL031587, AC002073, AC005288, AC005821, AC002310, AC004967, AC005071, Z93930, AP000553, AC007041, AC004703, AC006014, AC004552, AL023801, AC005015, AL035249, AC005081, AC007371, AC007216, AP000299, AL136295, AL031230, AL034549, AC003689, AL109628, AC004834, AC007358, Z98941, AC005620, AC007955, AC007382, AC007191, AC005765, AC006241, AL020997, AL031283, U91326, AL031659, AC005789, AC002544, AC005837, AL122023, AC005874, AF134471, AC004814, AC003047, AC005823, AC005086, AC004883, AL049843, AL009181, AL022323, AL008715, Z98200, AC012330, S79836, U11297, AL049832, AL096791, AL033547, AC002477, AC004125, AL050317, AC004882, AL031846, AC002357, AC002549, Z94801, AC007325, AL035405, AC007981, L47234, AC005911, AC000075, U80017, AC007151, AC002400, AC008079, U78027, AC004531, AC004983, AC004217, AJ003147, AF045555, AC004837, AC004257, AC006101, AC004953, AC004966, AC005363, AL050325, AC005606, AC006088, AC020663, AC007688, Z81364, AL024507, AC004832, U95742, AL022476, Z92542, AC004583, AF039907, AP000208, AC006544, AC005225, AP000247, AC007229, AL109627, AC008132, AF030453, Z99943, AC002553, Z97183, and AL049748.
HOVAC77	2238	578783	1 - 353	15 - 367	R06198.
HOVAC54	2239	578809	1 - 499	15 - 513	AA180856, AA312397, AA477002, N64587, F03493, AA722297, AA550850, AI141130, AW246295, X56997, AC005253, AL133448, AC002477, AC003663, AJ003147, AC007308, AC006064, AL022320, AC007421, AL022323, AC005632, AC006480, AP000704, Z83840, AC005786, AL049779, Z85986, AC005520, AC005004, AL132712, Z98036, AC005274, AC007637, AC005089, AB023049, AC005231, AL049776, AC005180, AL133353, AC007676, AC009516, AC007298, AC006285, AC005940, AC005081, AL031295, AP000356, AC006211, AL021707, U63721, AC006101, AC004883, AC005048, AC020663, AC000134, AC012627,
HOVAC26	2240	578810	1 - 410	15 - 424	

					AC005488, AC007546, AP000065, AL080243, AC006511, AC002470, AL078638, AP000049, AC005332, U85195, AC004019, AP000311, AC005531, AC004491, AE000658, AL135744, AC005412, AL023553, AL008582, AP000557, AC005391, AL139054, AC002365, AC006538, AP000116, AP000555, AC006014, AL031733, AC007226, AF003529, AL031589, AC006449, U82668, AF134726, AC005971, AC004890, AC005841, AP000509, AL022721, AP000343, AC003977, AP000248, Z98950, AL079342, AL050318, AL049569, AC005005, AC004253, AC005243, AC005899, AP000556, AL031848, AC002347, AC004000, AC005229, AL133445, AC005184, AC006026, AC005029, AL132777, AC007227, AC016025, AC005519, AC003962, AL109627, AC004139, AL035398, AL031432, AL078581, D87675, AL020993, AC003029, AP000212, AP000134, and AL031282.
HOVAB85	2241	578788	1 - 394	15 - 408	AA938198, AI480041, and AA836516.
HOVAB61	2242	578791	1 - 672	15 - 686	AI912696, AA189100, AA449441, AI298393, N66646, AI281387, N66606, AA448930, T40424, T41267, N22111, AL096827, and AF086039.
HOOKF10	2243	961499	1 - 479	15 - 493	AI292005.
HOOKF04	2244	925784	1 - 577	15 - 591	AI807982, AI240099, AA868661, AA625993, AW269043, AI221135, AI024201, N33757, AI799092, and AF092091.
HOOU04	2245	925774	1 - 345	15 - 359	AI432402, AI276478, AI675712, and AA662663.
HOOUN04	2246	925783	1 - 541	15 - 555	AI206132, AI760658, AW207202, AI361331, AI309566, AL119748, AI436462, AL049085, F37471, AL042628, AL040243, AL035684, AB014511, AF152243, AL122049, and AC000403.
HOOUK11	2247	965292	1 - 472	15 - 486	AI333634, and H78014.
HOOUH05	2248	928627	1 - 238	15 - 252	AI223084, AA411815, and AA403084.
HOOUJ02	2249	917454	1 - 372	15 - 386	AI192015.
HOUIL05	2250	928644	1 - 430	15 - 444	AA470830, AI859849, AI766193, AW439625, AW439820, AI962973, AA464728, AI888957, AA463944, AA235454, AI933818, AA468183, AA844370, and AI127133.
HOOUIG03	2251	922510	1 - 423	15 - 437	AA088667.
HOOUHP02	2252	917424	1 - 415	15 - 429	AW024908, AA678379, AA477631, N54347, and R26531.
HOOUHE67	2253	969061	1 - 795	15 - 809	N95228, AW016802, AI375092, AI985579, AI188610, AI656562, AI972873, AI991588, AW055145, AI936408, AI292190, AI094172, AW182193, AI191047, AI078514, AI763004, AI830734, R38989, R49050, AA046092, H49273, AI202609, R99234, AI262420, H19327, AL037112, W87481, AA581541, N94137, AI221613, AA404487, W69271, AI521710, Z38912, R05523, H12506, AI468774, AA046135, AI984653, AW236116, AA099158, AA019723, AI554117, AI090954, AW007126, N70968, AL035700, AC007270, and AF131754.
HOOUHD06	2254	933873	1 - 235	15 - 249	AI560165, AI955723, AW138740, and AL133011.
HOOUAB23	2255	522227	1 - 542	15 - 556	AW292981, AA363225, AA363226, AI250281, AI912329, AI745457, AI815151, AI744548, AI760693, AA076391, H74235, AA491864, AA557604, AW301854, AA601230, AL079769, W60522, AI370264, AA501906, H63742, AC005544, AC005921, AF053356, AC016025,

HOOAB05	2256	932925	1 - 569	15 - 583	AC006285, AC005702, AB023048, AF165926, AC005280, AL035089, AC007262, AC004000, AL031848, AC005529, AC004150, AL132777, AL049874, AC005844, AC006354, AL031733, AC005212, AL009181, AC005071, Z95113, AC007540, AL109865, AC007993, AC005520, AC004099, AF109907, AC002470, AF030453, AC000085, AC006958, D84394, AC005881, AL033527, AL133163, AL021154, AF152364, AL109839, AF118808, AC005261, AC005015, AL135744, AC009516, AC004797, AC002350, Z95152, AC005004, AC004686, AC005200, Z92542, AL031666, AF196779, AC002117, AL133448, AC005193, AC004253, AP000512, Z85986, AC004858, AC006344, AC005081, U82828, AL022336, AC004458, AC004963, AC006203, AC005726, AC002544, AC004841, AL022328, AP000553, AC005191, AL049694, AC004491, AC007055, AC003070, AC007207, AC006547, AC004531, AC016027, AP000689, AC006160, AC016830, AL022316, AC005288, AC005067, AC004659, L78833, AC005488, AL049758, AF088219, AC003982, AC006111, AP000555, AC006057, AC005694, AL049539, AC005065, AC000025, AL050307, AL022238, AF190465, AL034379, AC004970, AP000155, AP000013, AC004675, AB001523, Z83840, Z98941, AF067844, AL020993, Z82215, AC010209, AF200465, Z83843, AC007011, AC006101, and AC004024.
HONAK10	2257	968610	1 - 324	15 - 338	AI080164, and AA363261.
HONAH06	2258	936029	1 - 1105	15 - 1119	AA362963, AA281759, AW117976, AL135744, AF196969, AC006539, AC006077, AL049850, AC009516, AC004678, AP000553, AC005372, AC005411, AL049780, AP000114, and AP000046. AA362851, AI499938, AW085790, AA488903, AL043009, AW069227, AA443390, AA569648, AW304580, AA281461, AA547979, AL041706, AI688846, AW022934, AW021161, AW193432, AI634187, F36273, AI510838, AI344844, AW269488, AI061334, T47138, AI049709, AI471481, AW193265, AI963720, AI560085, AL079869, AI287651, AL046409, AW438643, AI341664, AI350211, AI755214, AI369580, AI334443, AI279165, AI148277, AW162489, AW270270, AI619997, AA581903, AW338035, AA350859, AW338021, AI754567, AI375710, AA610491, AI457313, AI613280, AI754105, AI355206, AA493708, AL079645, AI587583, AL119691, AI587565, AW270716, AW148792, H73550, T74524, AI431303, AW276827, AA714453, AI635279, AA169194, AA348311, AA483606, AI291268, AI291124, AI380617, AI287451, AW419389, AI687343, AA631507, AI167792, AI801600, AI053672, AA570740, AI371070, AA758934, AI284640, AI270117, AI801591, AW327868, AI340453, AI761471, AA181773, AI801482, AA599920, AI589230, AI135377, AA491814, AI471572, AI744995, AI379719, AA177061, AI912322, AI635819, AI017024, AW022379, AI733856, AW023672, AL118991, AI583142, AA577906, AW245354, AA847499, AI537506, AI446259, AA719805, AW237905, AI860020, AI300054, AC005730, AC002377, AC007240, AC005180, AC004531, AL049588, AC008372, AC005486, AL049776, AC006285, AL031602, AC002404, AC009784, AC005274, AC004453, AC004019, AC006064, AP000049, AL035659, AC005620,

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HONAE50	2259	723571	1 - 545	15 - 559	W86672, and AA362593.
HONAD65	2260	747152	1 - 290	15 - 304	AA362745, and AA085323.
HONAD02	2261	859016	1 - 1041	15 - 1055	AA362710, A1873444, AA889371, AW376675, A1261617, AW376657, AW390112, AW376696, A1857990, A1431824, A1963829, A1632752, A1590245, A1953341, AW376640, AA888092, AF118395, and AF118855.
HOGEW23	2262	973221	1 - 595	15 - 609	AW392670, U46349, AL119355, AW363220, AW384394, AL119443, AW372827, AL119319, AL119497, U46345, U46350, AL119341, AL119457, AL119399, U46347, AL119391, U46351,

HOGDQ03	2263	922578	1 - 402	15 - 416	AL119324, U46346, Z99396, AL119484, AL119363, AL119444, U46341, AL119483, AL119335, AL134920, AL119439, AL119396, AL134902, AL119522, AL134527, AL1042433, AL037205, AL119496, AL119418, AL039912, AL134538, AL119488, AB026436, AR054110, A81671, AR069079, AR060234, and AR066494.
HOGCW89	2264	973227	1 - 780	15 - 794	AA863353, D62887, AL119319, AL119355, AL119391, AW392670, AL119464, AL119324, AL119341, U46349, AL119457, AL119484, AW372827, Z99396, AW384394, AW363220, U46350, U46341, AL119497, AL119483, AL119363, U46347, U46351, AL119443, AL119444, AL119522, AL042984, AL119396, AL119439, U46346, AL134536, AL119335, AL037205, U46345, AL134902, AL119401, AL134538, AL042433, AL119483, AL119341, AL119457, U46351, AW392670, AL119355, U46349, AL119319, AL119483, AL119341, AL119457, U46351, AL119324, AW372827, U46346, AW363220, U46350, Z99396, U46347, AW384394, AL119443, AL119484, AL119363, AL119391, AL119444, AL119497, AL119418, AL042984, U46341, AL119439, AL042433, AL037205, AL119335, AL134902, AL119401, AL119522, AL134536, AL134538, U46345, AL119399, AL134525, AL119396, AL119496, AL119464, AR054110, AR060234, AB026436, AR066494, A81671, and AR069079.
HOGCT13	2265	657284	1 - 751	15 - 765	R54129, and R14999.
HOGCR31	2266	463874	1 - 592	15 - 606	R70301.
HOGCR10	2267	964761	1 - 687	15 - 701	N52836.
HOGCQ54	2268	859076	1 - 594	15 - 608	AA236968, AA761761, AA236930, AI823768, AI990131, AA195511, AW297141, AF139471, AP000547, and AP000365.
HOGCH05	2269	930813	1 - 663	15 - 677	N57691, H58749, and AF134882.
HOGCE07	2270	859077	1 - 531	15 - 545	R17461, and AA614012.
HOGCD61	2271	761991	1 - 465	15 - 479	R56752, F06590, AA338081, R15941, AA453210, T74962, R14640, F12752, AL117612, and AC009514.
HOGCC63	2272	745130	1 - 430	15 - 444	AA021008, and AA057308.
HOGCA65	2273	750308	1 - 547	15 - 561	T97004, AI076315, and T87200.
HOGB126	2274	847191	1 - 394	15 - 408	AA923566, AI754510, AI018234, W68384, AI376764, AI335263, AI143581, AA456821, AI949857, W18181, AW305247, AI613113, W68500, H30442, AI190109, H11954, R44819, AA873841, AA767140, R16196, H30441, R16198, T16809, and H88480.
HOGBE27	2275	682232	1 - 281	15 - 295	AA025299.
HOGAM36	2276	908904	1 - 960	15 - 974	AI631040, and AA594778.
HOGAI73	2277	764490	1 - 412	15 - 426	AA258075, AC007688, AC004878, AL133500, and AC006241.
HOGAI26	2278	681919	1 - 497	15 - 511	H48638, W03175, and H58992.
HOGAH71	2279	760431	1 - 355	15 - 369	AA055623.
HOGAG57	2280	734848	1 - 621	15 - 635	AA737314, AA682280, AA010792, AI143573, AA953433, H23757, AA011221, AA745273, AA188649, and AF205935.

HOGAD77	2281	772319	1 - 563	15 - 577	R85394, AI078027, and R84629.
HOGAC69	2282	756713	1 - 694	15 - 708	AA594141, AI740524, AI419995, AA903241, AW069464, AI340359, AW194431, AI017580, AA858303, AI803720, AA074277, AL044093, AI921819, AI557117, AI190687, U69197, AI802592, AA889669, AI983007, AA207148, H11397, H96787, H16250, AI814813, AA427905, AI33376, AI268881, AI061243, AI963361, AA191622, AA846829, AI819766, AI190464, N51259, AA669068, AI150891, AA157806, AA135198, AA206434, AI925182, AL044094, AA135111, AW169049, AA034036, AI472734, AA135106, AW272442, N22707, AA609322, AA910279, AI262450, N71642, AI362641, N66837, AI138341, AA847184, N45294, T15527, AA907298, AI433939, AW263961, N67513, AA658226, T89105, AW183696, AA931425, AW105669, AA541311, AA160287, AA578579, AW069630, AW166420, AW021379, AI799396, AA610333, AI216722, AA620459, AA741223, AA704085, AI970644, AI864144, AA588415, F10050, T94064, AI277023, AA904093, AA747271, AA593048, AI160470, AW090441, AI445175, AI873497, Z41528, D20243, T10553, AA043331, T11277, AI383429, AI868926, AA886271, AA613110, AA043332, AW384062, AI687569, R23931, R00190, N31181, AI917566, AI123136, AI132258, AF061940, AF061938, AF061941, and AF061939.
HOFNW81	2283	789232	1 - 499	15 - 513	AW149722, AA452511, AA452655, AA359415, AI802674, AA341041, AA852853, AA149479, AW247428, AA359435, and AF104222.
HOFNW69	2284	533713	1 - 658	15 - 672	AI694574, AI299316, AI916308, AI809867, AI683372, AI650987, AI216772, AI700681, AI634004, AL042841, AI968717, AL042842, T67552, AA031777, AA778375, AI290605, AI806369, AI379501, AI433552, AI934582, AI635280, AI917817, AI968679, AW205433, AA640031, T94679, AW073063, AA400802, AI560612, T94326, AA736650, R44761, T55416, and C01874.
HOFNW68	2285	753048	1 - 142	15 - 156	
HOFNW65	2286	815822	1 - 417	15 - 431	D38026.
HOFNW45	2287	720755	1 - 104	15 - 118	
HOFNW07	2288	953436	1 - 397	15 - 411	
HOFNU50	2289	724437	1 - 465	15 - 479	W00809, H71229, AI688559, and AC005412.
HOFNL96	2290	888569	1 - 366	15 - 380	
HOFNI90	2291	788947	1 - 353	15 - 367	
HOFNI85	2292	784366	1 - 303	15 - 317	
HOFNI72	2293	760643	1 - 332	15 - 346	
HOFNI71	2294	760392	1 - 353	15 - 367	
HOFNI58	2295	859094	1 - 337	15 - 351	
HOFNI56	2296	859093	1 - 396	15 - 410	
HOFNI42	2297	713816	1 - 290	15 - 304	
HOFNI37	2298	859102	1 - 346	15 - 360	

HOFNI33	2299	859103	1 - 333	15 - 347	AW248328.
HOFNI32	2300	699299	1 - 364	15 - 378	
HOFNI10	2301	964682	1 - 305	15 - 319	D86969, AF127774, and Z83822.
HOFNI02	2302	917347	1 - 189	15 - 203	
HOFNC80	2303	835718	1 - 353	15 - 367	
HOFNC79	2304	774037	1 - 411	15 - 425	
HOFNB63	2305	613681	1 - 307	15 - 321	AI251832, AA622670, AA888154, AA994676, AA890531, AI141391, AI025322, AI587539, AA628616, AI338781, AW055053, AI147905, AA040767, AW272916, AI192845, AI338006, AI095692, AI144012, AI051360, AI205873, AA970491, AI374939, AI678799, AI869782, AI423147, AA973818, AI439825, AI520772, AW438950, AI694600, AI040992, AA935932, AA418706, AI091801, AI750219, AA425949, AI636432, AI079960, AA872649, AI061431, AA779735, AW275907, AA576868, H97795, W61292, AA814520, AW440409, AA812517, AI274100, AI128370, AA861315, AW169816, AA026344, N50703, AA440389, AA147089, AI887699, H25461, AW270131, AI201428, AA099879, AI080203, AA173333, AA147095, Z21890, AW023278, AA780492, R52994, AI630374, AA173438, AW189739, AI890908, AA714013, R31084, H28954, AA037330, AA468886, T06660, AI217891, H07854, AA176908, Z41333, AI949085, D57501, AI351274, AA037329, AI864848, R34332, AA885673, AI079089, R80423, AA599378, AA464883, AI784205, R41882, AI864749, AI860102, T04889, T15425, AW189623, AA418715, AI982539, D53365, AW237884, T35361, AA284089, T25943, AA629755, W52902, H27251, AA489825, AI718058, AF000982, and U42386.
HOFNB55	2306	731801	1 - 54	15 - 68	
HOFNB51	2307	725684	1 - 419	15 - 433	
HOFMU70	2308	489858	1 - 142	15 - 156	
HOFMU67	2309	743184	1 - 1345	15 - 1359	AI394585, AI347406, AW300884, R60771, AI609950, N94357, AA768117, AA830837, AA778534, AI024114, AI340016, AI675916, AW027671, AW027648, AA983621, AI272784, AA918495, AA724472, AI335706, AI421130, AI340312, AI632085, AI159997, F35349, R49581, W52231, R36293, AI119324, AI431351, AI119399, AI119464, AI432666, AI119457, AI431346, AI432662, AI431243, AI042544, AI623302, AW392670, AI431354, AI431307, AI431316, AW372827, AI119443, AI432644, AI432649, AI431337, AI431312, AI432674, AI119355, AW128897, AI791349, U46351, AI432651, AI431230, Z99396, AI492509, U46350, AI432661, AI119319, AI134902, AI431238, U46349, AW081103, AI432675, AI431347, AI432653, AI119483, AI431328, AI432654, AI432655, AI431310, AW384394, AI432650, AI432677, AW363220, AI119497, AI432665, AI119484, AI119363, AI119391, AI431248, AI431330, U46347, AI432647, AI492519, U46341, AI119444, AI119401, AI432657, AI119341, AI431241, AI431345, AW128900, AI119418, AI042450, AI432643, AI431353, AI492510, AI431247, AI119439, AI431357, AI119522, AI119396, U46346, AI119335,

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HOFMU29	2310	824242	1 - 1023	15 - 1037		
HOFMT55	2311	888552	1 - 226	15 - 240		
HOFMT45	2312	891512	1 - 292	15 - 306		
HOFMS43	2313	947973	1 - 360	15 - 374		
HOFMS09	2314	972725	1 - 447	15 - 461		AW392670, U46347, AL043003, AL119439, AL119484, AW363220, AW384394, AL134132, AL119457, AL134530, AL134519, AL134531, AL134527, AL134528, AL043147, AL119522, U46351, AL119324, U46350, AL134536, Z99396, AL134533, AL134902, AL119497, AL119443, AL134153, AL119496, AL119396, AL119399, AL042989, AI142134, AB026436, and AR069079.
HOFMP09	2315	943358	1 - 545	15 - 559		
HOFMI25	2316	491360	1 - 412	15 - 426		H16801, and AW080504.
HOFMF82	2317	693987	1 - 155	15 - 169		
HOFMF81	2318	788733	1 - 383	15 - 397		AA425224, N23786, N36074, AA779556, T66056, H29680, R60682, AW367327, T77025, H08571, F13183, Z43231, R19696, AI668657, AI734217, R54134, R18168, F12174, F08075, F07164, AA642020, F06393, AA314127, T33549, R12223, W20302, F07553, F05907, F05321, F05322, F05267, AF182814, and AJ243721.
HOFMF19	2319	888780	1 - 445	15 - 459		
HOFAF25	2320	942367	1 - 981	15 - 995		AA829001, AA837772, AC008154, and AC009275.
HOFAD78	2321	886485	1 - 689	15 - 703		Z99396, AL038837, AL037051, AL036725, AA631969, AL039074, AL036418, AL039085, AL036858, AL039564, AW384394, AL039156, AL038509, AL039108, AW392670, AL039109, AL039128, AW363220, AL036924, AL119497, AL037094, AL039440, AL039659, AL038531, AL036196, AL039625, AL039648, AL045337, AL038447, AL036767, AL037082, AW372827, AL037526, AL036190, AL037639, AL039678, AL039629, AL119443, AL039423, AL036238, AL039150, AL038520, AL040992, AL042909, AL119391, AL119319, AL037077, AL119457, AL119396, AL119324, U46341, AL119483, AL037726, U46347, AL119484, AL119363, AL119341, AL119335, AL119355, AL038851, U46350, AL119522, U46351, AL039410, U46349, AL119496, AL036998, AL037615, AL037085, AL036733, AL039386, AL036268, AL119418, AL119444, AL042450, U46346, AL119399, AL134533, AL037027, AL037178, AL042614, AL045353, AL037205, AL119439, AL036765, AL036679, AL042965, AL042975, AL134528, AL036973, AL119511, U46345, AL036191, AL042984, AL119488, AL134527.

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HODKG07	2322	951875	1 - 662	15 - 676	AA653929, F20611, and F20581.
HODJU05	2323	929321	1 - 471	15 - 485	AL135682, AA446265, T26578, H06982, C14389, C14331, D80195, D59502, D59619, D80210, D80240, C15076, D80164, D80212, D80022, D80166, D80219, D80193, D81030, C14429, D59467, D59275, D80227, D81026, D58283, D59859, D80391, D59787, D51423, D51799, D80253, D80045, D80043, AA305578, D80269, D80038, D80196, D50979, D80188, D59889, D59927, AA305409, D80248, D57483, D59610, D80378, D80366, D51022, D50995, D80024, AA514188, AW177440, AW360811, D80241, D51060, AW178893, D80133, D80522, D80251, D80132, AA514186, T03269, AW179328, C14014, C75259, D80302, AW377676, AW378532, AW375405, C05695, AW177501, AW177511, AW377671, D80268, AW178762, D80134, AW366296, D80439, AW360844, D51250, AW360817, AW375406, D58253, D80064, AW378534, AW179332, AW377672, AW179023, AW178905, AW178775, AW369651, D80168, F13647, D59373, AW352158, D59695, D80949, AW352117, A910186, AW352171, AW176467, C14407, AW178906, AW352170, AW177731, D80247, AW178907, D52291, AW179019, AW179024, AW177505, C14298, AW179020, AW360841, AW178909, AW177456, AW352174, AW179329, AW178980, AW177733, AW378528, AW178908, AW178754, AW179018, C14227, D80157, T11417, D81111, D51103, AW179004, AW179012, A905856, AW178914, AW378525, AW367967, D59503, AW177722, AW177728, D51759, AW179009, AW360834, AW178774, AW178911, AW378543, AW352163, D58246, C06015, AW378540, C14077, Z21582, D59627, D80258, AW178983, D59653, AW178781, T48593, D58101, C03092, AW352120, AW177723, AA285331, D51213, A1535850, D51097, D45260, C14975, AW378533, C14344, D80014, AA809122, AW367950, A1557751, A1525923, H67854, H67866, AW177508, T03116, AW178986, D45273, AW177497, D80228, D59317, A1535686, AW177734, A1525917, D59551, C14973, D51221, A1557774, D59474, A1525920, D60010, AA514184, D60214, A1525227, C13958, T02974, T03048, C14957, C14046, A1525925, A1525242, A1525235, D51053, A1525912, AW378542, F13796, A1525215, AW378539, C16955, C05763, A1535961, Z33452, A1525237, A1525222, AC007686, A84916, AJ132110, A62300, A62298, AR018138, AF058696, AR008278, AB028859, X67155, Y17188, D26022, A25909, A67220, D89785, A78862, D34614, Y12724, I82448, D88547, A82595, X82626, AR060385, AB002449, A94995, AR016808, AR025207, AR008443, I50126, I50132, I50128, I50133, AR066488, AR016514, A45456, AR060138, I14842, A26615, AR052274, AB012117, AR066490, Y09669, A43192, A43190, AR038669, AR066487, I18367, A30438, X68127, AR054175, D50010, Y17187, A85396, D88507, AR066482, A44171, A63261, A85477, I19525,

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HODJL04	2324	926200	1 - 314	15 - 328		AA649610, AA761836, and Z97195.
HODHK07	2325	952193	1 - 521	15 - 535		H03808.
HODHG11	2326	966063	1 - 704	15 - 718		A1208573.
HODGL88	2327	859300	1 - 655	15 - 669		W78906, N87704, R01599, and AF131819.
HODGJ02	2328	918476	1 - 466	15 - 480		N77172, AA247874, and AC004492.
HODFY10	2329	963350	1 - 461	15 - 475		AA426476, and AA424622.
HODFX19	2330	842138	1 - 733	15 - 747		A1376921, AA975777, A1001802, A1986107, A1277187, AA024836, AA814148, AA946575, A1823500, A1934527, R01773, AA069448, A1214374, A1261766, A1740547, A1149941, R67552, A1761204, H22357, AA991800, A1394623, A1090982, T50900, AA634859, AA931388, and AF055496.
HODFX12	2331	969588	1 - 320	15 - 334		A1936005.
HODFX04	2332	926278	1 - 479	15 - 493		AA976439, and N77643.
HODFW95	2333	795281	1 - 798	15 - 812		W93859, W93898, AA829836, and AF086497.
HODFW40	2334	859320	1 - 542	15 - 556		AA972774, and A1694547.
HODFR85	2335	783789	1 - 489	15 - 503		N76385, AA954669, N71863, A1041474, and A1937830.
HODFL37	2336	948703	1 - 450	15 - 464		
HODFI11	2337	966065	1 - 476	15 - 490		AA242986, and AA242787.
HODFI66	2338	974317	1 - 523	15 - 537		
HODFH45	2339	974916	1 - 606	15 - 620		AL121595.
HODFG82	2340	779191	1 - 544	15 - 558		A1733904, and AA160258.
HODFF88	2341	974911	1 - 1843	15 - 1857		D80164, D59502, D80193, D80195, D59275, C15076, D80227, D58283, D80022, D80166, D81030, D59859, D51799, D59619, D80210, D80391, D80240, D59787, D51423, D80253, D80043, D80269, D50979, D80212, D80038, D80196, D80024, D80219, D80188, C14331, D59467, D57483, D59927, D80378, D80366, C14389, D59889, D50995, D80045, D59610, AA305409, C14429, D80241, D51060, T03269, C14014, AW178893, C75259, AA305578, D81026, D59695, D51022, AW179328, D81111, AW178775, D80134, AW378532, AW177440, D51250, AW352158, D80268, F13647, AA514188, AW369651, D80251, D80522, D51079, D80248, D80949, D58253, AW178762, D80168, D52291, C14227, AA514186, A1905856, AW177501, AW177511, D80133, Z21582, AW360811, C05695, C14298, AW352117, D80064, AW176467, AW375405, AW378540, C14407, AW377671, D51097, AW366296, D80302, AW360844, AW360817, AW375406, AW378534, AW179332, AW377672, AW179023, AW178905, D80132, AW360834, AA285331, D80439, AW352171, AW377676, AW178906, AW352170, AW177731, D80247, AW178907, AW179019, AW179024, D51103, AW177505,

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HODFE04	2342	926999	1 - 429	15 - 443	R83400
HODFD73	2343	909812	1 - 603	15 - 617	AL050332, AF050183, AF058790, AF058789, AF048976, and AB016962.
HODFC79	2344	774156	1 - 415	15 - 429	W93152, and AW272240.
HODEZ45	2345	974337	1 - 516	15 - 530	
HODEU01	2346	915167	1 - 508	15 - 522	R93800, T77247, and R08385.
HODET07	2347	952194	1 - 410	15 - 424	H80608.
HODES10	2348	963474	1 - 186	15 - 200	AA076702, and AC004928.
HODEO35	2349	859364	1 - 124	15 - 138	AA595928, AA461421, and AP000553.
HODEK82	2350	779245	1 - 673	15 - 687	AI660692, H96927, and AI471598.
HODEA14	2351	859375	1 - 664	15 - 678	N44316, L44479, AW016606, AA524565, AI809352, and AC004821.
HODDX64	2352	745810	1 - 460	15 - 474	N71060, T99547, AC001228, U51281, and Z97056.
HODDS89	2353	531075	1 - 476	15 - 490	N52086, and AA927904.
HODDS74	2354	765863	1 - 221	15 - 235	T77437, and AW292096.
HODDF37	2355	420051	1 - 536	15 - 550	AC002559.
HODDE02	2356	920961	1 - 419	15 - 433	AI378347, AI082130, and AA563785.
HODCZ64	2357	745966	1 - 391	15 - 405	C14014, D80253, D51060, D80366, AA305409, D80439, AA514186, D80166, D59619, D80210,

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HODCZ39	2358	875811	1 - 410	15 - 424	W04443, AA132310, R78009, and AC012627.
HODCV73	2359	764543	1 - 447	15 - 461	A1816780, A1458427, A1828772, AA970754, T90292, AA723211, C15270, R55335, A1700847, A1800369, F04197, AA172179, R48809, AA634235, H26791, AW137473, R48921, A1056206, and AL021920.
HODCV32	2360	859543	1 - 514	15 - 528	

HODCW83	2361	781287	1 - 194	15 - 208	AI570526, W35195, AA425012, AI190032, AI949009, AW236490, AI632129, and AI695985.
HODCV61	2362	868291	1 - 760	15 - 774	
HODCO15	2363	660502	1 - 608	15 - 622	W00867, AL045871, AL046306, AB014529, and AF176555.
HODCJ84	2364	973286	1 - 680	15 - 694	
HODCC05	2365	932633	1 - 772	15 - 786	AA773910, W28027, AP000549, and AC006946.
HODCA90	2366	792611	1 - 356	15 - 370	AA005005.
HODBZ85	2367	784526	1 - 370	15 - 384	H70407.
HODBX08	2368	960178	1 - 617	15 - 631	W87564, and AA837795.
HODBU72	2369	766284	1 - 336	15 - 350	AA503323, H89112, H89218, and AF086031.
HODBK84	2370	859558	1 - 614	15 - 628	AA682892, AC002116, AC007537, AC006071, AL031432, AL021366, AL050332, AC004921, AC004841, Z93016, AC002477, AC006960, and AC005480.
HODBF61	2371	742114	1 - 240	15 - 254	
HODBF40	2372	529387	1 - 325	15 - 339	AF179633.
HODBF33	2373	702750	1 - 179	15 - 193	N78634, AI655262, AI219603, AI337066, AW016620, AW299342, AA806525, AI343418, and AA314128.
HODBF17	2374	529389	1 - 338	15 - 352	AW297233.
HODBD93	2375	792579	1 - 510	15 - 524	AA150484, AA156687, AI915919, T24517, and AL122023.
HODBD73	2376	764670	1 - 503	15 - 517	R95802.
HODBC42	2377	529635	1 - 560	15 - 574	AA031438, AA031560, AI335617, and AC004067.
HODBA48	2378	721931	1 - 662	15 - 676	N35773, AA020962, AA429989, AA019518, and AC005046.
HODAZ21	2379	826693	1 - 606	15 - 620	D80195, D80022, D80043, D58283, D80302, D80038, D50979, C14389, D59467, D80164, D59275, D80253, D80227, D59502, D50995, AA305578, D51423, D80247, D80522, D80439, D80188, D81026, D80269, C14014, D80366, D59859, C14331, D80166, D59619, D80210, D51799, D80391, D80240, D59610, D59787, AA305409, D51022, C15076, D81030, D80248, D80212, D80268, D80193, D80196, D80045, D80219, AA514188, D59927, D80024, D57483, D80378, D51060, D51103, D59889, D80133, AA809122, D80241, AA514186, D80157, D80251, AW360811, AW177440, D51759, C06015, C14429, AW178893, T03269, D45260, AW377671, AW375405, C75259, AW178906, H67854, D59653, AW366296, AW360844, AW360817, AW179328, T48593, AW375406, AW378534, AW179332, C05695, AW377672, AW179023, AW178905, AW177731, AW378528, AW178762, AW179019, D59373, AW378532, AW177501, AW177511, AW179020, AW352171, AW377676, H67866, AW352170, T11417, C03092, AW178907, AW178908, AW179024, T03116, AI525923, AW176467, D51250, D59317, F13647, AW360841, AW360834, AW352120, AW177505, D52291, AW178775, AW367950, AW178909, AW177456, AW179004, AW179329, AW178980, AW178986, AW178914, AW178774, D80258, AW177733, AW178754, AW179018, AW352158, D59503, C14973, AW352117, D58246, D81111, AI525917, D80014, D60214, C14227, D80064, C14344,

HODAX45	2380	723449	1 - 384			AW378533, D59695, C14957, AI525227, AW179009, AI535686, AW179012, D51221, D59474, AW178911, D59627, AW378543, AW378525, AW378540, AW177722, AW352163, D60010, D59551, AW177734, AW177728, AI525920, and AA514184.
HODAV84	2381	592179	1 - 623		15 - 398	R07196, and N59556.
HODAV24	2382	679165	1 - 392		15 - 637	
HODAK55	2383	745532	1 - 411		15 - 406	H60974, R07912, N22871, and H84048.
					15 - 425	R83642, T81960, AW068239, H60497, N44274, AA318156, H10590, AW404818, AA642219, AA773468, N72512, W85743, AA009995, T92075, R12889, AA853594, W21986, AI686932, AW024419, AA743833, AA627696, AW162688, AW003662, AA326440, AW088539, R21041, AA053566, AI955325, AW364257, AI565761, AA337700, AI827029, AI137377, AF100752, AC004472, M30143, Z14044, and AF122048.
HODAK05	2384	932639	1 - 453		15 - 467	AA132943.
HODAE72	2385	529638	1 - 122		15 - 136	
HODAE55	2386	529637	1 - 163		15 - 177	
HODAE48	2387	529639	1 - 116		15 - 130	D61881.
HODAE01	2388	921680	1 - 306		15 - 320	H69836.
HODAA92	2389	790588	1 - 239		15 - 253	
HODAA85	2390	784534	1 - 173		15 - 187	
HODAA80	2391	529560	1 - 284		15 - 298	
HODAA69	2392	529563	1 - 334		15 - 348	AC007030.
HODAA54	2393	859582	1 - 237		15 - 251	
HODAA34	2394	529570	1 - 300		15 - 314	AL034553.
HODAA21	2395	859583	1 - 502		15 - 516	T48184, and AL035530.
HODAA15	2396	523382	1 - 119		15 - 133	AI022068.
HODAA07	2397	954157	1 - 106		15 - 120	
HODAA04	2398	927711	1 - 291		15 - 305	
HOCPU05	2399	928651	1 - 753		15 - 767	AI189844, AI201116, AA609456, AA584808, AA780934, AI219194, and AL022721.
HOCPH02	2400	917453	1 - 468		15 - 482	AI610771, AI469844, N40199, AA588746, T70544, N39125, AI937318, AI500487, R37094, R16096, AI748890, and AA258667.
						AA280263, AA403050, and AL050343.
HOCPF02	2401	917630	1 - 820		15 - 834	AA766710, AA767401, AA804400, AI860423, AI753904, AI434653, N66775, AA555232, AI357762, W45274, AA084504, AW249660, AI521525, AA846923, AI571863, AW249541, AW020150, AI926102, AA324559, AA326603, AA632024, AA324059, AW084445, AA773098, AI537368, AW008217, AA582622, AC016025, AC005071, AC005902, AC004820, AC005696, AC005919, AL022327, AC005971, Z82244, AL121652, AC007227, AP000240, AC005089,
HOCOV07	2402	951744	1 - 557		15 - 571	

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HOCMM01	2403	914464	1 - 814	15 - 828	AI348389, AA631606, and AL031297.
HOCMI24	2404	878363	1 - 512	15 - 526	AA088637, and AW298364.
HOCMC01	2405	914552	1 - 444	15 - 458	AA699519.
HNOJJ12	2406	969077	1 - 1757	15 - 1771	AW295026, AI276473, AI553987, H08317, AI955362, H50857, W38821, T75180, R56504, T70815, F12882, R19236, T78969, R20397, T98878, R19579, AI312653, H95935, AA090801, AA361971, AA479557, R92663, AA454914, AI659055, AI480397, AI524497, AI440293, AA788769, AI589107, AA630007, AI380567, AA564726, AI262311, AW027577, AI766536, AI332995, AA044714, AA100613, AI471849, AI674449, AI190957, AI632486, AI891104, AI298730, T77169, R45788, H22006, T86237, R80609, T83221, H20293, AI690130, AA368757, AW179044, W73553, N80081, AA730555, AI338393, and D25218.
HNOAD04	2407	926258	1 - 745	15 - 759	AA814415, AI378392, N45120, AI457108, AA809495, AA835661, AA831169, AI351546, R43018, R44581, AI824326, and AW136327.

HNNNB08	2408	957719	1 - 346	15 - 360	<p> AI467919, AI091495, AI219406, R66014, H12334, R71247, R26409, C18360, C18357, H53522, H02244, R78907, AA368929, R67934, R77608, R3813, R34846, R62787, R10842, R67128, R65605, AI937850, AL046409, AW303196, AW274349, R24497, AI471481, AW301350, AI613280, AW193432, AI375710, AI350211, AI341664, AI537955, AW193265, AI688846, AI345654, W79504, AI365988, AI291268, AI291124, F29989, AI334443, AA350859, AI053672, AW438643, AW406755, AI653886, AW419262, AI499938, AA649642, AI608771, AA133986, AI357551, AI281881, AW338086, AA594145, R24492, AL041690, AI358229, AW406162, R27623, AA719805, T07451, N25296, AA134367, R71050, AI198376, AI475569, AI340453, AI344844, AA654771, AI963720, AA551503, AA613345, T06828, AA599129, AW302013, AI061334, AA581903, AI635818, AI270117, AW079135, F19012, R62788, AA720758, AI284640, AW339687, AI379719, AA533725, AI744995, AW276827, AA630925, AA630030, AI133164, F18974, AW265009, AI262909, AA599920, AA714453, AA664015, AI583594, AI754955, AI801600, F36306, AA179136, AW338500, F03525, AI887483, AA491814, AI357288, AI888008, AI537030, AI564185, AI283911, AI289067, AL044940, AI568678, AI801591, AA577906, AA720702, AI364809, AI708009, AA825357, AI002834, AA074130, AL119691, AL042420, AA352803, AF150152, AW117750, M86143, AA525824, AI246119, AA603445, AA280632, R77905, AA486414, AI889923, AA446657, AA649705, AA970213, AA259245, AA973803, AA368936, AA621858, AI431303, AW088718, AI358343, AI049634, R98967, AI635272, AI370074, AI370094, AA861959, AA713815, AI370057, AW265385, AI471572, T29180, AA678436, AA364429, AL079812, AA513293, AA573020, R97934, AI446464, AI313166, AA810318, AA491762, AA579063, AI827234, AI917156, AI053790, AW338419, AI921188, AI697369, AA346458, AI370878, AI589230, AA629415, AA113376, AI871722, AA639248, AI135405, AA437161, AA664535, AA126777, AA829223, AI888518, AI434695, AW339568, AA641103, AA559290, AI963095, AI471543, AI754658, AI761471, AA623002, AA225072, AW088058, AL048925, AW103981, AI339440, AA621704, AA602528, AW303876, AC005281, AF077058, D83989, X53550, X75335, AF015157, M87919, U18391, U57005, U18392, X55925, U18390, U18394, X54175, X54180, U57006, U18393, X55930, I51997, S77605, U18395, X55926, U57009, U57008, X55932, X54178, U18398, U18387, X54181, U18399, X54176, X55931, S70707, U67801, AF015151, X54179, AF015153, AP000297, AL031668, X60459, AL078581, U18396, U57007, AF015147, X776629, AF015154, AL023882, AF015149, U67827, M37551, AP000044, AP000112, AF015155, U80017, U18400, AL117330, Z22650, Z84487, AC005914, AC004814, AC002350, AL121577, AC005535, AC005245, U66059, U78027, X55927, U57004, AF060568, AF161343, L47228, Z98258, AC004799, U73649, AL049692, AC008163, AC005815, AC004087, AL049745, AC004975, AC004915, AC007278, X53548, U67231, X55928, AL035665, AF123462, AC005907, AC004686, AL031777, X54177, X55924, AC005808, AC004841, AL035361, AL049759, </p>
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HNNA07 HNIAB92	2409	899742	1 - 619	15 - 633	AC007193, AL121825, AL021398, X88791, AL035422, AL079333, AL035460, AP000358, AL021069, AC021092, AC007919, AL049845, U91326, AP000151, AC004650, Z98941, AP000143, AC008115, AC004765, AL008629, AC004455, AC004895, AL049562, Z49816, Z68332, AC007051, AC000114, AR042836, AC005844, AC002119, AC005034, AF001549, S56773, AC007319, AC006160, AC004010, AL031388, AF023460, AC006511, AL136295, AB020872, AC006512, AC005745, AJ003147, U67831, U67233, AP000010, AC004933, AC007536, AL022238, X55922, AP000014, AC005391, AC006208, AC005837, AF095855, AC006277, AC005370, AC007878, AL034420, AL033397, AC005335, AC005776, AP000114, U95742, AL021808, AL049757, U62293, AL031848, AL035089, AL031286, Z85986, AC006213, AC005257, AC006305, AB020867, AP000090, AC004099, AC006599, AC004884, AC005516, Z69666, AF184110, AC007216, AL078463, AC007151, AL132992, AF053356, M87916, AL050097, U72787, AL121892, AL021453, AL096701, Z93241, U62292, AC005541, AL132985, AC006538, AP000502, AC004016, X55923, AL078477, AL049776, AC008072, AC002299, AC003119, AC005866, Z86061, AC005821, Z93024, AC005696, AC007308, AC005046, Z83846, AC009516, AL079340, U67222, AC007688, AC002544, AC010382, AC004526, AC006040, AD000092, S43650, AC007541, AC008062, Z95114, U67226, AL031255, AC001164, AC006128, Z82180, AL031685, AL136018, M19045, J03801, E01888, E02193, AC004931, AC005251, AL049839, AC004217, AC006960, AC008059, AC002470, AL133163, AC005358, AL133485, and U67229.
	2410	683077	1 - 199	15 - 213	AL039150, AL039085, AL039156, AL039108, AL039074, AL038837, AL039625, AL039648, AL037726, AL038531, Z99396, AL039109, AL040992, AL039128, AL036973, AL045337, AL037051, AL045353, AL036725, AL039564, AL039678, AL039659, AL039629, AL044407, AL039423, AL042909, AL039410, AL039924, AL039386, AL039538, AL038821, AL036858, AL037526, AL044530, AL036924, AL036196, AL039566, AL037639, AL045341, AL043422, AL038447, AL038025, AL038851, AL036238, AL043445, AL037615, AA514190, AL037082, AL039509, AL036117, AL036767, AL043441, AL043423, AL038983, AL036733, AL036679, AL037077, AL049018, D80134, D59619, T23659, D80196, D80219, AL044125, AL039643, T24119, AL045794, AL535983, AL037178, D51423, AL037027, H00072, D59787, T48598, T24112, H00069, D80253, AL036964, C14227, AA631969, D59927, AL041233, AL040193, AL041296, AL041086, AL043496, AL044162, T23947, AL037085, AL036268, AL041324, AL043538, AL040621, AL041098, AL041163, AL041277, AL041358, AL047012, AL041346, AL040155, AL041197, AL040463, AL047219, AL041227, AL047170, AL040119, AL041292, AL041051, AL040322, AL041131, AL046330, AL041133, AL041159, AL041238, AL041142, T11051, AL040625, AL040510, AL043467, AL044186, AL044037, AL040091, AL040128, AL040168, AL040285, AL040342, AL040332, AL040617, AL045684, AL040745, AL040370,

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HNIAB73	2411	764172	1 - 536	15 - 550	A18722, AF096810, X83978, A34724, I49890, I44516, A51384, I00077, E03165, E02221, E01614, E13364, S69292, A92636, X92518, I82415, I82416, I00079, A58526, A91753, and I07888.
HNIAB26	2412	974750	1 - 374	15 - 388	A1241225, AI497916, AI807817, AA287075, AA410717, W69383, W69382, AI167280, H75982, D31247, AA284123, F06544, T78145, AA419308, AA404625, N41831, AA339686, N56216, D31349, AA284532, AI672472, AI366704, AW130807, AI590376, AI274769, AI370149, and AI357616.
HNBVH02	2413	917719	1 - 272	15 - 286	AI128931, N59410, H71850, H68617, AW026005, H72896, R89336, R89422, AI890794, AL120188, AL117354, Y10196, and AC005535.
HNBVC03	2414	922402	1 - 384	15 - 398	AA455727.
HNBUC06	2415	933673	1 - 633	15 - 647	AI003929, AI203393, AI434650, AI741385, AI239480, AA931467, AI819627, AW183189, F31423, F35609, AA905778, F21790, and AW105048.
HNBUC01	2416	914361	1 - 520	15 - 534	AA501715.
HNBUI10	2417	961734	1 - 483	15 - 497	AA954976, AI017449, T89711, W69257, AI150048, AA534436, T89631, AI261657, AW166311, AI627633, AA947856, W69170, AI831660, AI473887, AA909065, AI140835, AA862617, AW449791, AW445047, T89808, and AI795971.
HLWFJ69	2418	754476	1 - 398	15 - 412	R76168, and R39664.
HLWFB01	2419	915399	1 - 481	15 - 495	AW451092, AI653216, AA825520, AA828034, AW449785, AA766435, AI379959, AA811081, AA626324, AA251105, AI281315, AI281259, AA252357, AI857494, AA767770, AA961612, AA884914, AI910531, AA883131, and AL117637.
HLWEH10	2420	963548	1 - 600	15 - 614	N27780, H55265, AC004527, and AL078614.
HLWEA90	2421	787632	1 - 438	15 - 452	AA397990, W65316, and AC010582.
HLWDZ31	2422	917643	1 - 880	15 - 894	AA758158, AA143336, AA311020, AW403447, W63569, AA004530, AA683390, N29003, AA209228, H28875, AA305513, AL120940, W77945, AA582670, AA297602, C18645, AW402233, R23541, AA132404, AI752266, AA115891, T19100, AA442767, AI768639, AW183765, AI816897, W38538, AI829074, R19741, T34258, H12133, W44478, F12975, R61604, N34198, AI769388, T34524, AL121186, Z30133, T31614, H06006, T34085, AW188331, AA429756, R80093, T28136, T75286, AI767235, AA126374, T34569, T34148, AI908731, AA864619, F07189, H12905, N33792, T85612, AI685398, T31638, H62867, N69429, N20135, H62527, AA352184, H82866, H09563, T31635, AI224550, AW363446, AA704311, H96883, R10946, N84652, T52635, W56201, D82488, D82543, R26017, AI274027, D82466, R10524, N36374, AI283942, D82428, AA962407, N90094, AA380459, W32740, N36598, AI224548, C06105, AI739339, AA132405, W27707, AA375383, F07315, F05953, AA310081, T78753, AA004531, F05952, AI023176, AI299400, R85616, W20495, H84839, T25453, N83818, T27432, AA054436, T25450, H63569, R53662, AW381573, AA694564, AA130964,

HLWDD01	2423	915378	1 - 419	15 - 433	AL008725, AF107406, D17446, and S83440. AI266250, AW069227, AI634187, AI457313, R83014, AA610255, R16565, R48980, AI254508, AI251696, AA715508, AA601673, AW090629, AL031296, AC004851, AC004031, AF207550, AL021367, AB022785, AP000065, AL110502, AF165926, AC005280, AC005253, AL009181, AC005828, AL049780, AC004531, U52112, AC005081, AC004890, AL031281, Z97054, AL133246, AC002314, AC006537, AC005940, AD000671, AC008124, AP000553, AF157814, AC004771, AL096791, AL020997, Z95115, AC005324, AC005669, AF134726, AC005209, AB026898, AC006965, M89651, AC004812, AC005291, AP000557, AL031255, AC005146, AC005071, AL109798, AC006241, AC006146, AC002477, AC005702, U80017, AC006449, AJ006216, U73629, AC009516, AC007386, AC004770, AF001549, AL022322, AP000509, D84394, AC005785, Z98044, U07563, AC007283, AC005067, AC007227, AC005231, AL035458, AC002472, AC005342, AC007676, AB017602, AC007055, L78810, AC006539, AC005914, AL023584, AC004560, AC004859, AC003982, AB002353, AL031228, AP000359, AC005086, AC006946, AP000694, AC000025, AC008545, Z95331, AC002115, AC007934, AL034420, AC006530, and AL035659.
HLWDB48	2424	856512	1 - 670	15 - 684	N42593, AA376825, AW104181, AI215001, N83895, AA374608, AW293450, AB020685, and M77174.
HLWCP60	2425	739801	1 - 419	15 - 433	AA053452, T07266, and AB020631.
HLWCN93	2426	791854	1 - 682	15 - 696	RI1514, R10440, R97177, AI890794, AL117694, U07563, L47334, AC005023, D83253, AL109802, Z84484, AP000009, AF001549, AC002978, Z84480, AC008989, Z93930, Z98742, AC005071, AC007993, AL031319, U89337, Z98044, AC002070, U91318, AF001552, AC007030, AC003046, AP000299, AL121657, AF039907, AC007450, AF190465, AC005722, AC005602, AL035410, AB000882, AC004750, AC006581, AC003009, AP000229, AP000113, AP000045, AC006543, AL035073, AC003683, AC002400, AC006312, AC008372, AC005409, Z82206, AC007227, AP000555, AC016025, AF053356, AL109967, AC006450, U63721, AC004953, AC005792, AC007773, AC004751, AP000502, AL009181, AP000689, AC006544, L48038, AC004878, AC006030, Z93244, AC004832, AP000696, AB003151, AC003101, AL035587, AL023284, AC004967, AF030453, and AC005231.
HLWCN50	2427	723787	1 - 416	15 - 430	N47899, H53415, and AL049742.
HLWCF83	2428	781069	1 - 660	15 - 674	W33061, R98276, and AC004022.
HLWCF33	2429	687995	1 - 489	15 - 503	AA121582, AW368442, AA188145, AB011132, and U90333.
HLWCE47	2430	720156	1 - 599	15 - 613	AI207452, AI936201, and AA005229.
HLWCB93	2431	623773	1 - 546	15 - 560	AW082490, AW157667, AI032875, AC005899, AC005231, AL109623, AC006449, AL049539, AL049779, Z98941, AC006312, AC004383, AC004491, AJ003147, AC007157, AL139054, AC006285, AC006450, AL031276, AC005792, AC005015, AC005086, AF196779, AC002470, AC002287, AC004913, AC004876, AL034549, AL133355, AL035587, AP001054, AL035413,

HLWBX42	2432	917920	1 - 445	15 - 459	AL109827, AC007546, AL049780, Z98200, AL109984, AC007151, AC005081, AC004813, Z85986, Z84469, AC007308, U91323, AC005902, Z84487, AL049709, AC007055, AL022336, AL031281, AF024533, AC005412, AC005585, and AC005484.
HLWBW29	2433	690515	1 - 375	15 - 389	AA427651, AI143307, AW262122, AA703186, AI659343, AI341865, AI336119, AW237136, AI298482, AI090247, AI333715, AI803140, AA579615, AI056488, AA779669, AA620404, AI089588, AI278727, AW090136, AI811913, AA427568, AI911844, H91654, AI610128, AW129695, AA593874, AI870923, AA651783, AA112592, AA058719, AI400566, AA506145, AA622437, AA478461, AA862138, AI784558, AI589813, AW007077, AW169327, AI377030, AW438992, AW328677, AA112591, and AC005606.
HLWBT09	2434	887877	1 - 405	15 - 419	H71264.
HLWBS62	2435	743406	1 - 627	15 - 641	AA214571, AI341246, AI686298, AI652114, W72303, AW391831, AW445137, AI672184, AI872269, AA805368, AA765438, AI865260, AI867970, AI364061, AA653004, AA283893, Z41015, AI652648, T82714, AW274161, AI964056, AC005203, and AC006111.
HLWBR85	2436	784261	1 - 431	15 - 445	AI984203, W67492, AA883778, W67493, and AF086252.
HLWBQ91	2437	790072	1 - 449	15 - 463	N91340, AF174590, AF199355, AF176699, and AL022395.
HLWBJ65	2438	747784	1 - 526	15 - 540	AA424081, and AL049611.
HLWBH92	2439	791355	1 - 443	15 - 457	AA457580, and R79039.
HLWBG78	2440	888068	1 - 395	15 - 409	T89902, H30889, H22380, and H43169.
HLWBF48	2441	721530	1 - 367	15 - 381	AI016222, R14088, AW189819, and Z73965.
HLWBE74	2442	887967	1 - 336	15 - 350	
HLWBC21	2443	869611	1 - 850	15 - 864	AI625008, W81042, AI161322, AI913667, AI284153, AA194209, AI654706, NS1502, AA194051, AW205155, AI739408, AI380903, AA025476, AW392596, AW385770, AI240820, AW135136, AI697491, AW204701, AA680407, AA478609, AI916011, AI242934, AI497867, AA341635, AA025395, AA693802, AA521100, AI392857, and AC002400.
HLWBA80	2444	720397	1 - 484	15 - 498	N41645, AW293280, AA287310, D86324, AF074480, AF074481, AB013814, Y15010, and D21826.
HLWBA27	2445	931387	1 - 614	15 - 628	W88551, AW404842, AA292392, N41305, AA292935, N41626, AA491168, AA444087, H01356, R76165, AA001523, W45105, N28012, N42038, AA084557, AA296707, AW402649, AA069991, AA293237, AA428716, H80482, AA551614, AA297430, AA298686, AA128142, R75992, R77570, H68568, AA627682, AA405634, R89661, H28321, R78029, AI908992, N45084, H48883, AA298929, AA151090, AA055024, AA122427, AA296825, H91109, AA315750, R83924, AI218665, H72458, R08383, AA132173, AA027794, AA046903, AA077970, AA296925, W02601, AA297915, AA297486, AA297626, AI582212, AW170331, AA297026, H50802, N33748, AA297426, H24598, AA297282, AA296904, AA419378, AA296946, and AF070657.

HLWAW86	2446	785395	1 - 522	15 - 536	AA460460, AA969196, and AA885014.
HLWAS09	2447	625419	1 - 223	15 - 237	AA602628, AA352444, AA363279, AC005969, AC004087, AL035414, AC006511, AL109627, AC004167, AL034430, AL133246, AC002543, L78833, AB022785, AC007055, AL049692, AP000032, AC005971, AP000065, AC005747, AC005726, and AL031311.
HLWAR08	2448	959139	1 - 378	15 - 392	AA078617, AJ133128, and AF160798.
HLWAO67	2449	751503	1 - 509	15 - 523	H82640.
HLWAL31	2450	948928	1 - 110	15 - 124	
HLWAI18	2451	666281	1 - 634	15 - 648	
HLWAF02	2452	919714	1 - 1216	15 - 1230	HI15126, AB006621, and AF043644.
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HLWAE09	2453	789030	1 - 451	15 - 465	R20247, AI200505, AW004679, AA157883, AA314101, F36978, AA225574, AW305024, F31978, AW005776, AW337620, AW028286, AI022592, AI039214, AI797665, AW080293, N53067, AA131444, AA126253, AA724826, AA428376, AA418101, AW197423, AA865238, HI0347, AA618216, AA069136, AA437116, C16904, F22050, AA147181, AA393974, AI970244, T11676, H56645, R58957, AA069174, N62528, AI908026, AW303992, AA069297, HI5057, AA031896, AA552427, and AL050260.
HLWAD57	2454	734655	1 - 450	15 - 464	AA213840, AI348503, AI680719, AA401344, AI868950, AI565065, AW058511, AI476408, AI298543, AI680824, AW207207, AA970373, AI084988, N74713, N22538, AL049651, AL133371, AL079352, Z83745, AC002416, AC006928, AL033539, and Z83848.
HLWAD33	2455	702317	1 - 454	15 - 468	AI220952, R21518, AC004675, and AF088219.
HLWAD32	2456	699158	1 - 289	15 - 303	
HLWAD02	2457	919725	1 - 529	15 - 543	AI500547, and AW276592.
HKZAH11	2458	965175	1 - 809	15 - 823	AI653262, AI637996, AI538731, AA808027, AL036361, AI536685, AI811344, AW087445, AA470491, AI499381, AI866090, AI608936, AI475371, AI270183, AI491852, AW088793, AI590415, AL079963, AW132056, AI284084, AI612913, AI537677, AW081036, AW102785, AL134259, AI818980, AW235482, AI802542, AL042745, AI635461, AL042382, AW051258, AI453322, AI271786, AW082113, AI637584, AI819976, AI698391, AI281773, AW150578, AI524671, AI926367, AI280637, AI559296, AI862139, AI491775, AI280747, AI890833, AI926790, AI564719, AI863241, AI932794, AI611738, AI955917, AI619502, AI677796,

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HJMBX19	2459	668568	1 - 405	15 - 419	R32287, AA455162, AA456525, AA135649, and A1083959.
HJMB577	2460	772101	1 - 314	- 15 - 328	AW104918, and N62731.
HJMB510	2461	964464	1 - 595	15 - 609	T92671, AP000309, AP000048, and AP000116.
HJMBQ90	2462	788834	1 - 543	15 - 557	A1912028, AW205965, AW204265, AA039572, and AA641146.
HJMBIN02	2463	919737	1 - 470	15 - 484	AA557385, and AC005214.
HJMBI93	2464	929114	1 - 390	15 - 404	AI090083, AI829485, AW205724, AA772573, AA845116, AA074956, AA115510, AW190595, AA022952, AI141599, AA628482, AI051949, AW371164, AI097055, AI890975, AI337839, AA736989, AI081563, AI041864, AI393834, AI469272, AI342319, AW338241, AW264160, AI583596, AI354880, AI183444, AI936936, AL047697, AA700866, N94495, AA543017, N93380, AI493628, N32842, AA026953, N35378, AI198542, AI033873, AI034219, AI092332, AW079884, AI862812, AA830087, TI15721, AI268105, N48023, AI280189, AI766704, W79295, AA771789, AA693396, AW081435, AI923501, AA789217, AI690543, AA704989, N69040, AA192860, AI758815, R39361, R97800, AI820003, AI378456, AI672120, D62879, F05041, AI904662, AI266086, AI914468, AA699763, AI907483, AA788953, AA923476, N79464, AA888029, AI355472, W81453, AI634896, T41193, AA649798, AA649807, R01135, AA862997, AI302880, Z39546, N69916, AA343461, AI221819, AI266004, AA939287, D62955, AA526695, T32169, H23424, AW152231, AI829263, D79898, N40473, AI040552, AI933545, AA484853, AA913558, H00652, AW409609, T24050, AW002183, AW020740, D79437.

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HJMAV93	2465	828110	1 - 431	15 - 445		A1828559, N33343, AA512946, AW242837, AA776086, AA908183, AW402709, AA761704, A1088906, AA035207, AA045460, A1418843, A1362157, AW183346, R05828, AA627883, AA026236, C20746, and AA349140.
HJMAU07	2466	961623	1 - 488	15 - 502		A1631661, A1656482, A1655799, AW168207, A1745171, A1739521, AW073890, AW161625, AW157477, AW157176, AW002703, AW090343, AA738238, A1906428, AW293743, AW328076, AW328075, AA249074, A1991472, A1653282, A1652717, A1654896, AW393827, AW393832, A1203310, AW390900, AA776677, AW390889, AA381902, AW364462, N93494, AW160794, AW163150, AW161159, A1802780, AA974383, AB016089, AF201422, AB016092, AC004493, AB016088, and AF161338.
HJMAQ86	2467	785410	1 - 544	15 - 558		AA082617, AA082622, T49308, and U73643.
HJMAQ14	2468	657579	1 - 465	15 - 479		R25621, C04010, and C03959.
HJMAJ91	2469	811222	1 - 439	15 - 453		H96543, AA043831, AW250847, A1741631, A1741642, T72311, A1761422, A1992202, A1143894, AA194496, AA635765, A1992194, AA983373, A1890651, A1341988, AA336193, A1081852, C02956, T84215, D79135, A1050718, AA424281, AA348739, AA194697, AA029252, W51957, A1475478, AA370818, AA349624, N80191, AA216646, A1805451, AA907523, A1248525, AA565574, W48641, AA609560, A1077909, AA378570, AA112530, AW408361, AA161054, A1709345, A1497917, A1074107, AA150947, W38482, AA279104, AA654134, A1131385, H08872, A1138451, W07568, and C03234.
HJMAI62	2470	742612	1 - 343	15 - 357		A1927723, AA430100, A1749184, AA493808, A1755214, A1754567, A1061313, A1797998, A1355246, A1299442, A1754105, A1090334, A1336771, AA659923, AA904275, A1732458, AA127499, AA630854, AA669238, AW172727, A1048060, A1821881, A1821918, A1049845, A1046519, AW272815, A1791457, A1732501, AA526415, D44672, A1859438, A1283938, AW167154, A1079553, AW238495, AW439703, AA297208, AA714110, A1076236, R83585, AW008184, N42508, AA468322, A1801563, AA577755, AA480486, AW410983, N38991, AA593537, A1598003, AW021608, A1686703, AW407632, AA535216, R94909, AW002831, AA470496, A1078409, A1274691, AW167799, AW151247, AA297666, AA469230, AA309156, AA600202, A1049643, A1620992, A1862716, A1884404, AC002325, AC001644, AC005233, AC005768, AL121603, AC004999, AC005484, AC005031, AC005682, AC005697, U95739, AP000501, AC004878, AC006312, AF111168, AL121653, AL021391, AC004910, Z99716, AL132712, Z94721, AP000355, AC005619, AL050318, AC004033, AC005565, AF196779.

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HETLF29	2471	909762	1 - 404	15 - 418	AA960957, AI001155, and AC004664.
HETJY68	2472	752542	1 - 598	15 - 612	AW002051, AI634267, AI243174, AA436186, AA436311, AI431959, AI061116, AA761592, H06947, N23373, AA086090, and AA947734.
HETJID12	2473	655199	1 - 497	15 - 511	AA054591, and AI090055.
HETHO01	2474	921649	1 - 420	15 - 434	H73781, H73794, and AA250749.
HETHB18	2475	529467	1 - 233	15 - 247	
HEITF68	2476	529587	1 - 193	15 - 207	
HETFF43	2477	529589	1 - 190	15 - 204	AC002430, and AC007384.
HETDU61	2478	742157	1 - 407	15 - 421	R09668, W27308, AI017666, and T40006.
HETDA25	2479	677490	1 - 323	15 - 337	T75438, and AC005041.

HETC027	2480	533536	1 - 101	15 - 115	AC004525.
HETCH01	2481	961038	1 - 577	15 - 591	T63959, AI903998, AI903827, AI903970, AA846926, AI903969, and T25149.
HETBM55	2482	929285	1 - 419	15 - 433	W58542, W58508, AA338107, AL110415, Z21137, AA677723, AB033071, and AL049742.
HETBE61	2483	965638	1 - 690	15 - 704	AA044700, AI217938, AA621573, AI341648, AI888183, AA448474, AI378270, AI377879, AA761808, AA908986, AI554608, AI499447, AA405744, AI658858, N94970, AA826528, AA845274, AA337749, AW104676, AA514257, AA450024, AA446662, N99058, AI200828, AI638236, AA749175, AA907567, AI860350, N30595, AI015967, W56551, R42965, T72602, AA496049, AI240555, AI628397, AA992373, F09967, AI680576, AI970903, AF120324, AF120323, and AF151833.
HETAS91	2484	790499	1 - 699	15 - 713	N40393, N27230, AI001868, W03460, AA336991, AA293193, AA456181, AA352669, AA404703, AA404253, AA455873, and AB029039.
HETAS81	2485	778539	1 - 272	15 - 286	AA195574.
HETAS62	2486	754155	1 - 475	15 - 489	N94153, AA337208, and AL021368.
HETAJ14	2487	660831	1 - 744	15 - 758	W73113, W73134, AA336749, and H71426.
HEQCC01	2488	924849	1 - 991	15 - 1005	AI984000, AW269830, AI801497, AI376738, W44650, AI951239, AI299070, W44651, AI277888, AI090780, AI460194, AA913912, AA889345, AI469976, AI277222, AI470014, AI302046, AI352112, W70230, H57665, AW385653, W70229, AI206087, Z24798, AI141926, W61319, H58505, AW129398, AI393721, W65404, AA092527, AW385674, AA853182, AA527482, AI147785, AA229903, AI916555, AI832158, AB037938, and AC004477.
HEQBT78	2489	773528	1 - 239	15 - 253	AA088215.
HEQBP18	2490	855578	1 - 451	15 - 465	AC005412, AP000212, AP000134, AC005081, AC002302, AC005015, AB003151, Z97055, Z85987, AC005899, AL035415, AC005088, AP000688, Z99128, AL139054, AL079295, AC004953, AC002094, AF196969, AF001549, AC006480, AC005914, Z81369, AC004966, AC005480, AF045555, AC004491, AC002544, AC006530, AC005011, AC004659, AP000553, AC003109, AC004815, U91323, AC006449, AF196971, AL034379, AP000689, AF064861, AC005225, AF030453, and AL050307.
HEQB109	2491	739877	1 - 241	15 - 255	AI682994, AI860517, R59606, AW128847, AA427939, AW089100, AA688398, AA678726, AA865152, AI301869, AI537473, AI635629, AA206817, AI635651, AI635668, AI589266, AA382581, N30811, W26239, AA522648, W51988, AA083277, AR068569, and E02783.
HEQBG85	2492	827915	1 - 262	15 - 276	AA242840, D31085, AA375146, AA329739, AA359153, AA375223, AA461165, AA852329, AA113413, AA461339, AI375044, D86983, and AF200348.
HEQBG60	2493	427813	1 - 366	15 - 380	CI6876, AA194321, AA433852, C17161, AA180946, AI525618, AI557711, AA074286, C17197, C17260, AI061627, AI114766, AA632855, AL036120, AI110700, AI110702, AI733732, AI110877, AI133691, AA247674, AA469023, AA469454, AI557407, AA468291, AA469339, AA533497, C18679, AI791942, AW277101, C18086, AI525833, AA457778, AI557430, AI525740, AI525655, AI114723, AL037233, C17850, AI525594, AI110881,

HEQBE78	2494	772860	1 - 399	15 - 413	AI114736, AI557512, AI133606, AI557620, AA190509, AA099765, AI525675, C17646, AA496319, AI065146, AI110734, AI114585, C18308, AI133681, AA225972, AA211183, AA193158, C17276, AI133444, AI525609, AA149719, AA210993, AA193139, AI133323, AI111183, AA192142, AA650320, AL036950, AA985072, AA147287, AA263129, C17869, AA111992, AA730713, AI525223, AI525224, AI174851, AI133348, AI525704, C1777, AA213805, AA259235, AA214706, AA112937, AA187242, AI002878, AA095540, AI524915, AI525208, AI525308, AW270677, AA610217, AA096071, AA179575, AA226053, AA093633, AA192769, AI110870, AI525584, AA677781, AA092031, C18932, AA714096, AA211267, AA193022, AA193077, AA186774, AI557196, AA713554, AI541088, AA090151, AA090965, AA196107, AA180127, AA090969, AA088526, AA090214, AA085797, AA094071, AI678834, AA104032, AA096116, AI750078, AA083602, AA090907, AA579547, AA573649, AI557051, AI064914, AA177026, AA091026, AA093711, AA082180, C17762, D51282, AA090990, AA179142, AA090166, AA090807, AA130057, AA090943, AA197087, AA196431, AA187784, AI833114, AA195842, AI207615, AI720161, AA115803, AA180940, AI002718, AI557661, AA757623, AI133486, AA095787, AA603485, AA618243, AI147501, AA215934, AA090757, AA093442, AA659381, AI114764, AA249267, C18118, AA090144, AA092908, C17330, AA837217, AI459413, AI721213, C17357, AI114553, C18846, AA929066, AA094655, W56031, AI721239, AI114569, AA091885, AI720842, C17253, AA216092, AA089796, AA604085, AA196942, AI366461, AA091799, AA464911, AI832465, AA249171, AA091648, AI174902, AI525114, AI133302, AA094383, AA736456, AI557580, AA214119, AA467951, AA216196, AA176675, AA090764, AA071205, R28885, AA093449, AA653037, AA487737, AI985682, AA515626, AA131159, AA213941, AL047782, AA192982, C02686, AA559143, AI833042, AI114776, AA652805, AA985256, AA090427, AA641024, AA091970, AA090288, AI541480, AA092535, AA197267, L08441, I27367, X93334, X54629, J01415, X62996, V00662, D38112, AF134583, U35430, X93347, D38113, X93335, D38116, D38114, AB005535, and A70826.
HEQBE71	2495	760305	1 - 439	15 - 453	AC006254.
HEQAZ01	2496	916321	1 - 448	15 - 462	T893326.
HEQAM59	2497	739220	1 - 146	15 - 160	W20223, and AW300240.
HEQAK94	2498	793250	1 - 286	15 - 300	AI884723, AI971997, AW136547, AW168144, AI582351, AW028249, HI11116, R36152, AI982536, R71232, AI926458, and AC004126.
HEQAF54	2499	729594	1 - 451	15 - 465	R53056, and H08598.
HEQAD73	2500	914044	1 - 579	15 - 593	AW291088, AA037761, AI937151, AA148558, AI207722, AA143058, AW242313, AA039270, AA150219, AW248839, AW134681, AA782955, AW044454, AI720406, AA159625, AI824032, AI359017, N44915, AW247279, AA136239, AW249260, AA136326, AA736535, AA312218, AA159616, AA165673, N33099, AI677832, AI869047, AI867484, AA159698, AW247893,

HEQAA93	2501	792255	1 - 546	15 - 560	AA934072, AA143176, D60324, R29152, AI590805, AW169153, N57511, AI393129, AI080402, H83533, N34512, AF161487, AF161527, AC007565, and AC007229.
HEPCB04	2502	941270	1 - 512	15 - 526	W92197, AI272825, AA016235, W94926, AI243425, AW082258, AW297127, AI241137, AI424820, AA813649, and AI289258.
HEPBO92	2503	952996	1 - 427	15 - 441	AI917109, AW003912, AI080595, AA235033, AA235201, AW450977, AI969306, AA193652, AA193549, AI928801, R22829, T69554, AA588382, N94214, N80329, R17380, AL023581, AF153605, and AF151861.
					W80428, AI281960, W58699, AA417821, AI191334, AA524259, AI140335, AI272028, AI198251, AI279567, AI077948, W58105, AA976989, AI279283, AA568684, N75444, AI768190, AA471035, AI042070, H27894, R69416, AI207043, AI093933, AA931805, AA057072, AA776787, AI356687, N89605, AI830795, H20193, AI125808, AI125797, AI160353, AI394538, AI336185, AI858974, AI352347, AI268758, AI298093, AI298398, AI268851, AI191106, AA976789, AI184456, AW000778, AA479904, AA976567, AI184383, N80954, AA328860, AA482453, AI338345, AI042254, N68172, N80657, AI813413, N68196, AI343021, AA705334, AA931904, AA532627, AA721003, AA715390, W69319, AW327781, AI301403, W58698, W58215, N68260, AA481706, W05193, N54740, AI086220, AA159198, AI369601, AI074994, AI184042, AW439353, W69215, AW149380, H03721, H19993, H83921, H02830, AA428492, AW071418, N80631, R98136, H83779, R69545, AI800014, AA603925, H20384, H72739, T35392, AI026120, H50256, AI370680, AI554686, AA356398, AA765315, AW150959, AW008524, AA513681, AA481467, and R48307.
HEPBO85	2504	783362	1 - 679	15 - 693	AI090010, AA779356, R70094, AI088640, R79670, R28363, R39498, and AF121177.
HEPAY26	2505	825778	1 - 180	15 - 194	AI678727, AI373871, AA335883, R47985, AI915014, and AA586390.
HEPAX40	2506	535627	1 - 726	15 - 740	AI888322, AA149051, AA149050, AI081764, AI985657, AI862905, AI082688, AI559607, AW151020, AI275490, AI824512, AI240781, AW294730, AI370307, AI925301, AI491857, H28424, H39903, D62631, AI956009, and AI137566.
HEPAX16	2507	667665	1 - 473	15 - 487	AI216316, N95121, AA524146, AA826400, AI572953, AA576084, AA243582, AA693835, AA648272, AA830864, AA872868, AI083498, AI278286, R64633, AI919073, F25383, AI624649, AI380699, AW027102, R64632, AA975873, AA971324, and AL035416.
HEPAQ35	2508	707533	1 - 520	15 - 534	T86787, N47173, AA335769, AA406114, AI560856, AA410382, and AA774453.
HEPAP34	2509	703336	1 - 669	15 - 683	AA458879, AW138005, AA406623, AI749863, AI299810, AI968830, AI084067, AI749131, AA335721, AI473485, AA976661, AA464428, AA411695, AW130055, C03960, AI880337, AI904562, AA864979, AA781665, AI198298, AA430699, AI275029, AA706499, AW206841, C01121, and AI695779.
HEPAN05	2510	932893	1 - 477	15 - 491	AI218711, AI918047, AI918977, AI288674, AI085618, AI139776, F29008, AA335421, AI929165, F35667, AC004751, and AC004646.
HEPAK04	2511	933039	1 - 477	15 - 491	AI004158, AA335529, AA847893, AI262232, AW292700, AI950883, AA808598, AW183055,

HEPAJ14	2512	657440	1 - 231			AA505961, AA478576, AA255751, A1468599, A1417159, A1678423, AW043579, A1333775, A1521274, AA009947, A1379044, A1089360, A1027938, AW173026, N49409, AA417796, AA173415, R94723, A1972464, W31503, H63962, A1703182, AW193647, A1741193, AA456887, AA470626, AA885985, D30922, and AC006557.
HEPAJ04	2513	933091	1 - 353		15 - 245	H26683, and AA335271.
HEPAE58	2514	509130	1 - 348		15 - 367	A1219496, A1187819, AW085963, AA335263, AA669515, AC007993, and AC002094.
HEPAE02	2515	921389	1 - 211		15 - 362	R46509, AA335475, AA335926, and Z63111.
HEGBC03	2516	922550	1 - 290		15 - 225	AA484651, AA335440, and AC004887.
HEGBB67	2517	751233	1 - 340		15 - 304	A1445299, AW005649, A1470184, AB032959, and AL021393.
					15 - 354	AW295266, A1765278, A1261553, A1367242, A1050799, A1333693, A1672068, A1308137, A1769877, AW003759, A1201838, H18343, A1761277, A1823875, R85423, H18100, A1760769, A1984928, AW149699, H20325, R84272, AA860751, A1369859, A1262936, A1474901, AA013231, AA013325, and H18141.
HEGBA01	2518	915596	1 - 425		15 - 439	T51466, and AC006333.
HEGAX04	2519	927260	1 - 522		15 - 536	AA236038.
HEGAQ91	2520	789940	1 - 261		15 - 275	H54234, AL037663, W84821, A1012221, A1007014, and AL031319.
HEGAL55	2521	731654	1 - 423		15 - 437	A1962879, AA133284, A1863307, A1679213, AA768727, AA417760, A1083774, H95609, A1538225, AW409962, AA516124, AA417846, AW196578, AW074110, A1168476, A1825102, and A1885413.
HEGAJ08	2522	959216	1 - 557		15 - 571	AA059456, AA040649, R60003, AA058951, A1970861, AA662962, AW268083, and AA045527.
HEGAC02	2523	918992	1 - 519		15 - 533	AA813370, and Z93016.
HEEAY84	2524	782706	1 - 370		15 - 384	N77524.
HEEAX09	2525	912065	1 - 400		15 - 414	AW305246, AA405462, and AA3336099.
HEEAW40	2526	710655	1 - 385		15 - 399	AA176878, AA984649, and AB009973.
HEEAP59	2527	738892	1 - 401		15 - 415	AA083887.
HEEAM25	2528	677599	1 - 771		15 - 785	AA086139, A1088145, AW131790, A1857700, A1283095, A1813629, A1917113, A1478664, A1919281, A1967944, A1499083, A1655215, AW136596, A1767765, A1825582, W16832, AA831238, A1381212, AW028578, Z19309, AA912593, A1497888, H86248, AA019370, and AF061261.
HEEAH94	2529	794257	1 - 332		15 - 346	A1832117, and T60136.
HEEAH76	2530	769950	1 - 503		15 - 517	T90469.
HEEAH57	2531	734488	1 - 475		15 - 489	AA158378.
HEEAH16	2532	661827	1 - 598		15 - 612	W94212.
HEEAG51	2533	930810	1 - 430		15 - 444	T51329, R55106, AW298352, U73637, AF015416, and AF083108.

HBEAG12	2334	724929	1 - 546	15 - 560	
				AA577763, AA633422, AL037129, AA400644, A1814562, A1951746, AA160713, AW273309, A1760380, A1829095, A1830606, AW410028, AA069839, A1762794, AA740152, A1079211, A1831826, A1436417, AA715294, AW248582, A1479090, A1446523, A1564707, A1580739, A1718353, A1114856, A1031714, A1979218, AW020139, A1927726, A1625558, A1803385, N63450, A1499665, AA609811, AL041488, A1559675, AA808909, A1805112, AA721567, A1356504, AW131446, A1371162, A1608666, AA621666, A1711835, N47802, AW303837, A1635165, A1792502, A1792459, A1681955, A1356534, A1741024, AA461161, A1371783, AW167885, AW269461, AA186776, A1961876, A1569468, A1983819, A1198692, A1677976, A1580884, A1285382, A1627469, W69718, A1684007, N26300, A1285371, R74106, AA070631, AW082099, A1187296, A1122688, A1619582, A1923356, A1053500, AA465244, A1568377, A1475683, AA569404, AW131064, N62435, A1378096, A1114801, A1361711, A1538412, A1053809, AW102909, A1284485, AA609804, AA157510, AA983155, AA719436, N69868, A1581694, AA813458, A1025704, AW068095, AA730994, N49709, A1254995, AA772777, A1272877, A1025243, N68207, AA074131, W29008, A1241762, AA069789, N49747, AW001954, A1635898, AW167269, A1821623, N24969, A1565122, AA679739, AW295592, A1708945, AA426103, A1129305, H81268, T57228, AA454089, AA173256, AA570192, AW167442, H88671, A1888551, AW130022, AA218723, AA490126, AA160557, AA629812, AW316580, T48377, W07841, AW238570, AA402187, N64337, A1401141, AA582071, AA582069, N71249, W28998, AA878904, A1537917, AA398896, AA393126, AA158019, AW028732, W81377, AW117980, A1587486, AA385065, N67689, A1686807, A1969514, AA070932, R69118, N55579, A1951358, AA501522, A1690866, R82294, R69237, A1866191, AA069566, AA807712, W95312, A1539138, AW151663, R49753, AA557272, F27924, A1200767, AW073563, W94577, AA861022, A1074168, AA490869, A1682865, AA719453, H89972, H16003, AA972251, AA888800, AA311106, AA479531, AA158667, AA725811, AA365495, A1751587, A1624034, AA015906, AA569951, T74260, H93995, AA716314, AA452503, AA863083, AA506968, H02178, AA429696, AA427565, AA720992, H43481, F26439, AA828474, T55982, AA504793, R27973, AW193086, A1001209, AA630055, A1791854, A1886874, A1752142, AA255883, A1359741, AA340175, AA031466, AA427714, N79151, R46819, H53048, D11678, AW014403, T55334, AA485288, AW316811, AA429565, AA832289, AA398182, F27649, H88719, AA015746, AA046017, A1289762, H86474, R85355, W78088, R68012, AA485423, F22385, N49815, H60678, X07417, A1238283, AB026899, AP000352, Z75889, AP000500, AL031057, AL031430, AC005192, AL118497, AP000345, AL021394, AC006077, Z69705, AC005013, AC007372, AC005681, AC004754, AC004757, AL049837, AL109938, AC005667, AL024507, AF186194, AF020802, Z75746, AC005881, AC005530, AC002544, AC007666, AC006132, AB023056, AF165926, AC007999, L09706, AC000378, AC000052, AC005206, AL031671, Z83843, AP000555, AJ004799, AC002487,	

					AL031391, AC006344, AC004019, AF019413, AC006539, AP000502, Z11740, AL109847, AP000514, AL049839, AB014080, AC004067, AP000520, AF117829, AP000687, AC005204, AC006039, AC004558, AJ229041, AL022721, AC007066, AC002295, AC006441, AC004206, AL096773, Z83826, Z83841, AC004887, AC005962, AL034394, Z94054, AC005694, AC004860, AC004167, AC003991, U91326, AC007687, AC006952, AL023875, AJ011930, AL117356, Z82976, AP000354, AL050321, Z98742, AC006222, Y18000, AC020663, AC003663, AC005570, AC008981, AL034421, AC002525, AC004448, AC004858, Z83844, AB023048, AL035407, AL022101, AP000511, AL133246, AL031685, AC006251, AL023575, AF109076, AC005006, AL135745, AJ003147, AF165147, AF109907, AC006008, AF050154, AC005529, AL133243, AC006427, AL049653, AL035458, AC004520, AL096703, AC005034, AC004021, AC006198, AC006236, AC005531, AL022332, AC006992, AC004922, AL035073, AC009731, Z98304, AL021877, AL079342, AF129077, AC007546, AC007860, AC004912, AC006449, AL035455, AC002299, AL121756, AL121653, AC006557, U92032, Z84489, AF053356, AC005510, AC004655, AL035681, AP000432, AC006121, AC004813, AL020995, AC005324, AF111169, AL031650, AC008282, AC005913, AC006011, AC005829, AL031594, AL022401, AL049776, AL133312, AC016027, AC004213, AL021918, AP000350, AP000457, AC005343, AL022400, AC007225, AC005668, AC002375, AC007172, Z93403, AL133245, Z93017, AL034402, AL035608, Z84487, AC005874, AF134471, AL022723, Z95889, AL136504, AF107885, AL133297, AL109758, AC000353, AC005828, AC004474, AL031602, AF134726, Z69710, AL121577, Z73900, AC007560, AL021938, AC006120, AC006026, AC008101, AC007376, AL021154, AF011889, AC002531, AB000879, AC005971, AB000882, AC002402, AC002455, L34079, AL020997, AC007387, AL137191, AC000134, AL135879, AL121790, Z95437, AL034430, AC005320, Z82203, AC005684, AP000506, Z82215, AC015853, AL008583, AC004973, AC004158, AC005832, AC005060, AC002996, AC016830, AL133304, AC003102, AC002536, AC009241, AF052041, AC006313, AL049539, AC007283, Z82196, AC005567, AC007298, AJ010395, AC004762, AL049757, and AL021397.
HEEAD13	2535	470886	1 - 182	15 - 196	N44039.
HEEAB40	2536	710668	1 - 414	15 - 428	R08794, AI470646, AA506458, AA303007, AI002941, AI933534, AI691091, AI903462, AW380254, AA011026, AW021735, AW275510, AA493695, AA321168, AA455670, AW089101, AI311927, AA131035, AI933658, AA019312, AA635739, AW338179, AA676971, AI460009, AW004884, AA788982, AA188676, AI633390, AL045739, AI584186, AA679154, AI431240, AI469968, AA179944, AI888752, AI005388, AI872020, AI927741, AA834707, AA223174, AA358515, AA527209, AL042225, AA847515, F25733, AW193461, AA600869, AW022897, AA101689, AI268334, AI268336, AW276827, AL120343, AL046205, AA572713, AA584612, AI687343, AI249573, AI696595, R07234, AW023865, AW168618, AW270343, R68223, AW265009, C75026, AA467820, AI611569, AI611598, AI043009, AI045057.

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HEAAX26	2537	684734	1 - 264	15 - 278	U75931, Z81450, AP000302, AC005525, AC006127, AC006138, AF037338, AC005202, AC004755, AC005624, AC005568, Z69733, AC002499, Z70688, AF050154, AC007565, AC006277, Z93024, AC005777, AC004643, AL049856, AC004209, Z70051, AC006139, AL080242, AC004696, AL121934, and AC002037.
HEAAU20	2538	911255	1 - 443	15 - 457	H97463.
HEAAR47	2539	973284	1 - 444	15 - 458	H91826, and Z97989.
HEAAR21	2540	883939	1 - 522	15 - 536	AC004672.
HEAAN43	2541	842032	1 - 323	15 - 337	AW295831, A1369420, AW298562, AW151269, and AC005146.
HEAAM71	2542	950736	1 - 612	15 - 626	R97645.
HEAAL76	2543	770200	1 - 425	15 - 439	T87255, AA078363, and AC008039.
HEAAG84	2544	896892	1 - 591	15 - 605	AA169155, and A1741303.
HEAAG42	2545	714041	1 - 1098	15 - 1112	
HEAAB66	2546	844361	1 - 804	15 - 818	AA044749, AA135685, AA135713, AA156933, AA099390, AA099389, R67663, AA135671, R66064, R24427, AA044673, AA043522, and AA043523.
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HCORB05	2547	928679	1 - 426	15 - 440	<p>AF026124, AF047716, M96857, AF039138, AF039137, A27171, AF081571, U78525, AL110224, AL122121, AF057300, AF057299, AF182215, X83508, AL137300, AF179633, AF169154, AL080086, AL137429, X66862, I09360, and AL133093.</p> <p>AI343543, AA580865, AA932494, AA581041, AL119399, AL042544, AL042382, AL119457, AL079794, AL043168, AL043152, AI345347, AL119511, AI698391, AI624293, AI627988, AI890907, AW161156, AI002285, AW130930, AI868931, AI682798, AI866770, AI884318, AW051088, AI886753, AI572096, AI270429, AI473536, AI624120, AW130534, AI889189, AI918449, AI620284, AI538850, AI587121, AI491775, AI702073, AL079963, AL037454, AI570807, AW163834, AI538055, AI499890, AL120853, AI824576, AI433157, AI916419, AI241923, AL039086, AL119863, AI270183, AL043355, AI633125, AL037582, AL037602, AI538564, AI915291, AW152182, AI580436, AI670009, AI918435, AL038445, AI445992, AI923989, AW169604, AA806720, AW021717, AI627893, AI863382, AL037649, AI866469, AI493567, AI917252, AW080746, AI500061, AW192687, AI866083, AI961589, AA641818, AI686906, AI567582, AI267162, AI799183, AI671642, AI919500, AI567769, AI582932, AL079741, AI521560, R32821, AI950729, AI963846, AW167083, AI954183, AI612913, AW050850, AL121014, AI802542, AW238688, AI623941, AL036274, W74529, AI890507, AI207656, AI969655, AW129659, AI446373, AW131294, AI579901, AL036638, AW129230, AI919534, AL041734, AW151136, AI445990, AI926878, AI631095, AI872423, AI635016, AL036673, AI932794, AI536738, AI434741, AI874261, AI285448, AW193911, N29277, AI766348, AI452560, AW020397, AI889376, AI648509, AI572021, AW161579, AI866040, AL041772, AI280607, AW022699, AI859991, AI537261, AI623179, AI799408, AI254226, AI630252, AI923370, AA579618, AI869125, AI440239, AL038605, AI434468, AW162194, AI345416, AI802240, AI345612, AI270706, AW051258, AL045500, AW079409, AI288305, AI54821, AL134259, AI690748, AL046595, AW303152, AW026882, AW020419, AI609069, AI522052, AI345415, AA740450, AI889372, AL048496, AW149925, AI571439, AI860003, AI800155, AI963458, AI345778, AA420722, AW089275, AI874166, AI702068, AI284517, AI702406, AW243886, AA127565, AL046200, AI284484, AI801152, AI288285, AW083374, AI612750, AW192652, AL119324, AI698427, AI540674, AA502794, N33175, AI685517, AI559619, AW020693, AI471282, AI954504, AI884528, AI499963, AW149026, AI580198, AI493576, AW198090, AW118518, AI917963, AI345745, AI538764, AI500588, AI866465, AI284131, AW090071, AW160916, AI651840, AI815232, AW168452, AI281762, AW006032, AI866457, AI630928, AI590630, AI242248, AI439452, AI590830, AA908294, AI863191, AI355779, AI628331, AW090736, AI499986, AW102864, AI354630, AI619502, AL040241, AI951950, AL036802, AI768496, AL121365, AI870192, AI866090, AI536574, AI287233, AI635067, U77594, Y11587, I89947, AF139986, I48978, I33392, Z82022, AF158248, U35846, AF090900, A08910, A08909, AR013797, AR038854, A77033, A77035, AF111849, AF177401,</p>
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HCOPM06	2548	933473	1 - 616	15 - 630	AI494320, AI289626, AA349607, and AC004230.
HCOP107	2549	951645	1 - 399	15 - 413	AA683346, AI991127, and AW385510.
HCOPF07	2550	951655	1 - 476	15 - 490	AI027619, AA926665, AA954546, AA398085, AA621275, AA634531, and AA724256.
HCOOF07	2551	951693	1 - 504	15 - 518	AI160370, AA993156, and AW269609.
HCONP02	2552	917577	1 - 332	15 - 346	AA226397, H29285, Z39193, and D61466.
HCONM33	2553	971637	1 - 463	15 - 477	AI339840, N40932, AW044507, AI216527, AI620878, AW316937, AI292180, AI358083, AI954691, AW006263, AA321122, AA321123, AI654341, N46790, AI953114, N69895, AI970523, AA226346, AA226347, and AF196969.
HCOMM05	2554	925952	1 - 1647	15 - 1661	AI681802, AA534542, AL044632, AI912061, AI912050, AI271683, AA587766, AA143726,

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HCHQA48	2555	908495	1 - 558	15 - 572	R71963, and AF201303.
HCHOX63	2556	957690	1 - 942	15 - 956	W52941, H61325, AW024501, AA594317, AW182848, H55390, Z83838, and Z93244.
HCHNW48	2557	862478	1 - 312	15 - 326	AA778950.
HCHMX82	2558	850340	1 - 566	15 - 580	W85822, A1379248, AA935747, W85821, and AF111167.
HCHMW18	2559	966985	1 - 524	15 - 538	W30916, N99978, A1660617, AA307815, AW166174, AA877685, A1692837, F07221, A1123170, A1906507, AW390249, AA078788, and AB017614.
HCHMJ89	2560	786765	1 - 300	15 - 314	T79918.
HCHMI96	2561	800129	1 - 567	15 - 581	U91323.
HCHMI15	2562	935298	1 - 946	15 - 960	A1202736, AL134545, AW298000, AA126125, R54251, H12916, A1497978, AW296905, T35758, A1347137, AA190916, Z42146, A1989727, R96064, AL050318, AB023181, and U67140.
HCHCI07	2563	952957	1 - 486	15 - 500	AA77369, AA700323, A1243088, AW292657, AW292654, and AL031666.

HCHCH68	2564	869084	1 - 488	15 - 502	AA494453, T75265, R51391, T78355, AA368764, R61709, AA101560, R35616, and Z25135.
HCHCG28	2565	686431	1 - 590	15 - 604	T77459, AA052981, T89679, AII38597, AW104281, AW050704, AA053474, T78622, AA677771, AW207204, A1049552, AA005222, AA51524, H07942, C01507, and A1367213.
HCHCE78	2566	773428	1 - 226	15 - 240	AI142134, AL038838, AL037436, AL038822, AL037295, AL038983, AL040617, AL044186, AL041238, AL047012, AL044037, AL047170, AL040463, AL040576, AL041752, AL045684, AL038532, AL040625, AL037727, AL047219, AL044162, AL040839, AL043677, AL040193, AL043467, AL040510, AL040621, AL043538, AL047183, AL043496, AL040464, AL046442, AL041133, AL041324, AL037435, AL043492, AL040322, AL041602, AL041098, AL044125, AL041347, AL041096, AL041635, AL045753, AL043923, AL043814, AL040294, AL043845, AL038761, AL044074, AL044064, AL041955, AL041459, AL041577, AL041730, AL040052, AL041523, AL043627, AL040472, AL041374, AL046850, AL040768, AL043848, AL040444, AL042135, AL043570, AL046994, AL046914, AL039316, AL046392, AL045671, AL041246, AL049018, AL045990, AL039643, AL037341, AL037343, AL037335, AL045857, AL079852, AL037443, AL037323, AL037279, AL039432, AL042096, AL042898, AL038745, AL039360, AL134524, AL043941, AL045817, AL547295, AL547006, AL040075, AL045328, AL041163, AI541506, AL041296, AI526186, AL040119, AI547039, AL044272, AL046327, AL041086, AL044258, AL040149, AL041168, AI526194, AL044199, AL041159, AL041344, AL047057, AL045920, AL040148, AL041358, AL044201, AL040458, AL044187, AI526073, AL041233, AI546855, AL041292, AL041346, AL040571, AL041142, AL040332, AL044529, AL039338, AL040529, AL079878, AL041197, AL046330, AL040745, AL040370, AL044274, AL040128, AI525320, AL047036, AL045989, AL047163, AL040342, AL040553, AL041186, C16305, AA585476, AL040414, AL041277, AL039744, AI526187, AL134110, AL040285, AL040155, AL040091, AL044165, AL043440, R28735, AL041131, AL040090, AL041051, AL040168, AL043775, AI526176, AL041278, R29177, AI557084, AL040253, AI546891, AL041227, AL040082, AL043444, AL040329, AL046150, AL041140, AL045327, AI525306, AL040255, AI541345, AL040385, AL040238, AI541535, AI535660, AI535639, AI546899, AI546921, AL040263, AI541356, AI526184, AI557262, AL045725, AL038651, D61254, D29033, AL043612, AL039915, AL049069, AL043537, AL046147, AL041210, AL080031, T23957, AI557787, AI557864, AL046097, AI557279, AJ239433, AI525321, T23888, Z28355, AI541510, AI557727, T23985, AI541527, Z30131, AI541365, AI557148, AI541013, AI525203, AI540967, AI557807, AL048677, AI541374, AI525556, R29218, AI547250, AL045211, AI525431, C15189, AI557734, AI546945, AI541514, AI546999, AL046099, AA585439, AI541509, AI541307, AI547291, AI541523, D57186, AA585101, AL045994, AL045340, I08396, AR064707, AR038762, I08389, AR035975, AR035977, U94592, AJ230935, Y09813, I19525, X81969, AJ230902, I66487, E13740, AR009151, D13509, Y16359, I66485, AJ238010, A91750, I15718, I08395, I15717, AR066494, M28262, AJ230951, AR031566, A85395, A85476, E03627,

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HCHBQ27	2567	682308	1 - 232	15 - 246	<p>AI142134, AL037436, AL038838, AL038983, AL037295, AL037435, AL037727, AL038532, AL038822, AL037323, AL037443, AL040617, AL044186, AL041238, AL047012, AL040294, AL041635, AL044037, AL045817, AL047170, AL040463, AL040576, AL040573, AL041752, AL045684, AL040625, AL047219, AL044162, AL043923, AL043814, AL044074, AL041602, AL043492, AL040839, AL043677, AL040193, AL043467, AL040510, AL037343, AL043845, AL037335, AL040621, AL043538, AL047183, AL043496, AL040464, AL040442, AL040472, AL044064, AL041730, AL041523, AL041133, AL043627, AL041459, AL041577, AL041324, AL040052, AL040322, AL040444, AL040149, AL041374, AL041098, AL046850, AL040768, AL046994, AL040119, AL041955, AL043848, AL046914, AL043570, AL042135, AL041096, AL044125, AL045920, AL040075, AL041163, AL044272, AL039316, AL047057, AL041347, AL046392, AL045671, AL040458, AL041159, AL038761, AL044199, AL041292, AL041358, AL041168, AL044187, AL044258, AL041296, AL040148, AL040332, AL045990, AL041142, AL041346, AL041086, AL049018, AL040529, AL040370, AL040745, AL046330, AL041197, AL046327, AL040128, AL047036, AL041233, AL040342, AL040571, AL040553, AL041246, AL039338, AL044274, AL040285, AL079878, AL041277, AL042096, AL044165, AL040091, AL040155, AL039360, AL041186, AL041131, AL039744, AL037341, AL045989, AL040414,</p>

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HCHBM26	2569	681404	1 - 140	15 - 154		AI142134, AL038838, AL037343, AL038983, AL037436, AL037335, AL037323, AI547295, AL037443, AL037727, AL038532, AL134524, AL044125, AL038822, AL040193, AL037435, AL044162, AL041347, AL047012, AL040621, AL043538, AL043496, AL043923, AL043814, AL041238, AL044186, AL040617, AL041324, AL043845, AL040463, AL047170, AL038761, AL044037, AL041635, AL040294, AL044064, AL041459, AL041577, AL047219, AL040464, AL040625, AL040576, AL045684, AL041752, AL045753, AL037295, AL046850, AL040768, AL041098, AL046994, AL046914, AL040052, AL040510, AL043467, AL040444, AL043677, AL040839, AL047183, AL043492, AL041602, AL041246, AL044074, AL041730, AL041523, AL043627, AL041374, AL043848, AL043570, AL040472, AL042135, AL046442, AL040075, AL041133, AL045671, AL045817, AL041955, AL040322, AL039316, AL045328, AL041296, AL041096, AL046392, AL040119, AL039360, AL041163, AL044272, AL041086, AL044258, AL042096, AL040149, AL041168, AL044199, AL041159, AL047057, AL045920, AL040148, AL049018, AL041358, AL038745, AL040458, AL044187, AL041233, AL039643, AL041292, AL041346, AL045990, AL040571, AL041142, AL040332, AL042898, AL037341, AL039338, AL040529, AL079878, AL041197, AL046330, AL040745, AL040370, AL044274, AL040128, AL047163, AL043941, AL134110, AL047036, AL040342, AL040553, AL041186, AL040414, AL041277, AL039744, AL044201, AL040285, AL045989, AL040155, AL040091, AL044165, AL046327, AL041131, AL040090, AL041051, AL040168, AL079852, AL043775, AL041278, AL039432, AL040253, AL045327, AL041227, AL037279, AL040082, AL043444, AL045857, AL040329, AL040255, AL040238, AL041140, AL038651, AL040263, D29033, AL045725, AL039915, AL043612, AL048677, AI547291, AL041210, AL044529, AI318479, AL041344, AL049069, R29218, AA585325, R28895, AA283326, T10982, R28967, AL038878, R28965, AA174170, R28892, R29262, T11028, R45895, R28735, R29445, AL038024, AL048714, R29177, AA585476, R29172, AL045211, AL047340, AA585101, D61254, Z28355, AI546875, AI557734, AI526176, AI557864, AI541356, AI525306, AI557262, T18597, AL043537, D57491, C16300, T23957, T23985, D59436, R29179, AI526184, AI541508, AI525500, AI525431, AI541523, AI547006, AI546999, AI525556, AI547250, Z32822, D55233, C14723, AL048657, AI541374, AA585439, C16293, D53472, C16305, AI557787, AI526194, AI541514, AI546945, AI540967, AI541390, AI557763, AI541205, AA585329, T41289, AI557731, AI541365, C15737, D57186, AI541533, AI557740, AI557727, AI541535, AR064707, AJ238010, AR066494.

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HCHA162	2570	743411	1 - 135	- 15 - 149	AL134524, AL045327, AL045328, AL047163, AL042898, AL134110, AL038838, AL037343, AL547295, AL037295, AL038983, A1142134, AL037436, AL037335, AL037323, AL037727, AL037443, AL038532, AL038878, AL044125, AL047037, AL037435, AL038822, AL041347, AL040193, AL043923, AL043814, AL047012, AL041238, AL044162, AL044186, AL040617, AL043845, AL038761, AL043496, AL040463, AL047170, AL044037, AL041635, AL040294, AL040604, AL041459, AL041577, AL047219, AL040576, AL040625, AL045684, AL043538, AL041752, AL040621, AL045753, AL046850, AL040768, AL046994, AL046914, AL040052, AL040444, AL040464, AL040510, AL043467, AL043677, AL040839, AL043492, AL041602, AL040474, AL041730, AL041523, AL043627, AL041374, AL047183, AL043848, AL043570, AL040472, AL042135, AL041324, AL046442, AL041133, AL045671, AL041098, AL039643, AL041955, AL045817, AL039316, AL040322, AL040075, AL046392, AL039360, AL040119, AL038651, AL041096, AL044272, AL041246, U46344, AL04258, AL042096, AL041168, AL041163, AL044199, D29033, AL041159, AL045920, AL040148, AL047057, AL040149, AL041296, AL049018, AL040458, AL044187, AL041358, AL041086, AL038745, AL041292, AL045990, AL040571, AL041346, AL041142, AL040332, AL043941, AL039338, AL079878, AL040529, AL135012, AL041233, AL037341, AL041197, AL046330, AL044274, AL040745, AL040370, AL040128, AL079852, AL039432, AL040553, AL048677, AL047036, AL045989,

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HCHAH04	2571	487985	1 - 61	15 - 75	
HCHAG52	2572	726081	1 - 395	15 - 409	
HCDMF96	2573	796196	1 - 418	15 - 432	AI459248, AI701427, AI023601, and N91037.
HCDME32	2574	863374	1 - 593	15 - 607	AA405957, AA416555, T19219, AL134902, AI142134, AL119355, U46349, AL119457, AL043004, U46346, and AR066494.
HCDMC86	2575	785134	1 - 316	- 15 - 330	AI675751, AA977468, AW183837, AI208676, AA401383, AI184678, AI016502, AA448192, and AA927251.
HCDMC25	2576	677627	1 - 565	15 - 579	H10593, and AI221385.
HCDMC23	2577	675490	1 - 354	15 - 368	
HCDMC22	2578	672815	1 - 228	15 - 242	AL119791, AI318280, AI611348, AW149236, AI257023, AI590830, AI567351, AI886753, AI866798, AL040241, AL038445, AI446373, AI285826, AI345745, AI446538, AI680498, AW268122, AI340603, AA572758, AL036631, AI288285, AW161579, AI312428, AI923989, AI567612, AI866770, AA012905, AI783504, AW163834, AW302965, AL036638, AI348854, AL040169, AI537677, AI802240, AL121463, AW088899, AI345347, AA420722, AW151138, AI538885, AI500659, AI570861, AI917252, AI648684, AI431424, AI499986, AI589267, F37471, AI500523, AI865906, AI246319, AI335426, AI590423, AI348777, AI457188, AI889168, AW132034, AW188382, AL036146, AA493647, AI633419, AW089572, AI926800, AI815232, AI249497, AW074993, AI349614, AW238730, AW268253, AA225339, AI312152, AI284131, AI873644, AW149227, AI345735, AI344785, AI627988, AI923370, AI569583, AL079963, AL038605, AI620284, AI254727, AA640779, AI349937, AI445992, AL120853, AI349645, AI874166, AL045620, AI500061, AI670009, AI433157, AI254042, AI702073, AI610402, AW087200, AI801793, AW022682, AI281773, AW105601, AI871709, AI823670,

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HCDMC06	2579	934663	1 - 364	15 - 378	<p>AI249688, AW265688, A1077941, F00533, AA904275, AW341903, R70333, H71250, AI185394, AW380074, AL046746, AA779783, AI640411, AL287921, F23327, AA504878, AA640260, AW271904, AA177075, AA526193, AA593471, AI8033809, AI446205, AA569190, AA381762, AA745356, AI205181, AW275719, AA847029, H82416, AA342189, AA657835, AA664604, AI536625, AI281474, AW408063, AI754037, AA310557, AW270768, AI915081, AI824541, AL039187, AI038304, AI569100, AW192599, AI754105, AA598927, AW131356, AI755214, R91827, AW157005, AI754567, AA262752, AI028510, AW008074, AI624528, AW383952, AI338426, AL120976, F00982, R70883, AI080307, AI570943, AA743811, AI872503, AA992126, AI291037, H91844, AW277174, AW069450, AI859438, AI580707, AI581486, AW268190, D58782, AA805841, AA666215, AI377413, H96518, AC006121, AC009248, AL034420, AC006044, AF107885, AC005089, Z93017, AL009181, AC007967, AC005071, AC004217, AC000041, AC005971, Z99716, AP000553, AC004531, AF038458, U91326, AC002350, AC005037, AC008372, AC006285, Z84480, AC003101, AL035450, U02047, AC004253, AC005944, AL023803, U95739, U62317, AC016025, AC005740, AC005064, AC005562, U73649, AP000252, AL049776, AC005632, AC005516, AC002059, AC006211, AC000134, U91321, AC005730, AC006026, L48038, AC002398, AC007012, AC009516, AC019014, AL139054, AL132777, AL021394, L78833, AC002477, AC002544, AP000212, AP000134, AC006277, I34294, AC006064, U07000, AC006130, AC004797, AC007327, AL049589, AF178650, AL109939, AC006538, AP000106, AC007225, AC004975, AL021391, AC004633, AL031577, AC004000, AC005069, AC005726, AC005696, AL035410, Z82208, AL023807, AL096791, AC007363, AL022326, Z79997, AC007686, AC006449, AC005670, AP000692, AD000833, AL049692, AL121767, AC004883, AP000245, AL035045, AB001523, AL021368, AC002375, AC005664, AB020865, AC000026, AL022336, Z74617, AC005539, AC007242, AC007666, AC004757, AF222686, AL078611, AL024508, AP000115, AP000359, U85195, AL049745, AC005756, AL049757, AC004596, AC002310, AL031281,</p>

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HCDMB91	2580	789551	1 - 330	15 - 344		AA297443, AA564510, H01110, AA730795, W96277, AA020873, AA947369, AC005031, AL008719, U80017, AC005015, AC004996, AC002511, AC004655, AC002991, AC002477, AC004253, AC005231, AC002565, AC003665, AC006312, AC005837, AP000556, AL034379, AP000557, AP000552, AC006275, AP000247, AC004216, AC007919, AC005484, AC005529, AC002301, AC005821, AL031673, AC006449, AC000025, Z98742, AP000106, AL034421, AC000379, AC005527, AL049869, AC002404, AC002365, AC005924, AC005102, AC000003, AC016025, AL023807, AC002312, AC005081, AC003950, AL049757, AL109758, Z99774, AC004019, AC004531, AL135744, AC005288, AL022165, AC005071, AC007225, AL022721, AL109628, AL021878, AC002470, AL096701, AL050350, AC000353, AC005736, AF196969, AL021155, AC005730, AF053356, AC004125, AL080243, AC004702, AC000052, AC006121, AC004890, AC007151, AF196779, AC004967, AC005921, AC005520, AF129756, AF111168, AC007688, AC005911, AC002300, AP000514, AC004832, AC004477, AC007055, AC007637, AC002310, AC004098, AL023553, AC004910, AL031255, and AF111167.
HCDMB42	2581	713300	1 - 230	15 - 244		
HCDMB41	2582	711996	1 - 563	15 - 577		AI525277, and AA079259.
HCDMB27	2583	682389	1 - 323	15 - 337		
HCDMB12	2584	968918	1 - 613	15 - 627		AL134524, AI142134, AL038983, AL045328, AL037727, AL042898, AL047163, AL049018, AL038838, AL037343, AL039643, AL037436, AL037335, AL037323, AL037443, AL038532, AL041125, AL047012, AL040193, AL044162, AL037435, AL041347, AL040621, AL043538, AL043496, AL040464, AL038761, AL038822, AL043923, AL043814, AL041238, AL044186, AL040617, AL040463, AL047170, AL043845, AL041324, AL045327, AL044037, AL041635, AL040294, AL041098, AL047219, AL044064, AL041459, AL041577, AL047183, AL040625,

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HCDMB08	2585	958542	1 - 255	15 - 269	AA719107.
HCDMB03	2586	923316	1 - 375	15 - 389	AL119691, A1305766, AW103758, A1284640, A1247199, AA634889, AA679532, A1345681, A1345675, AA584167, AA551552, A1345157, A1344812, A1473475, AW274346, AA747070, AW021207, AW072923, AL043009, AW069769, A1696962, AA515909, AA613203, AA551503, AW419262, AW264934, A1801482, AW265385, A1754336, AW088846, AA167055, AA580808, A1133164, A1334464, AW440545, A1754253, A1469968, AA493975, A1045526, AA683258, AA812281, AW193265, A1345418, A1457397, AW302903, H70994, A1888752, AA478355, A1687343, AA630362, AL038072, AW302013, AA521323, AA490183, A1350211, AW438643, A1872020, AA521399, A1859438, A1334443, N35896, AA303007, AA662225, AA515549, A1138396, A1270117, AA502860, AA483771, AA806796, A1471543, AA083046, AA526787, AW301554, AA831375, A1860013, AL134972, AL038474, AL046409, AW103509, A1634384, AA482768, AW131249, A1262909, AA661921, AW020340, AA220943, A1754658, AW276817, AA525824, AL120775, AA829223, A1554718, AA878438, AA603185, AL037040, AA514854, AW276827, A1698447, A1053672, AA577906, AA533725, A1245679, A1688846, AA459749, AA503258, AA507824, A1254913, AA244357, AA501821, AA722372, A1613280, F27407, AA483936, AA372481, AC006128, AC008372, AL023575, AL023880, X54181, AC006323, U04355, X54180, X55926, U18391, AL031734, U18395, A132766, U57005, U18394, Z82976, AL035079, U18387, U57009, AC005932, U18398, X55929, U18396, X55927, U57008, AC009509, X55925, AL023284, AC000115, AL021395, U18392, AC005756, X54178, X55931, X54175, X55932, U18388, AC005409, AC005821, U57006, X54179, AC006441, X55933, U18399, AC000353, AL021154, Z85986, AC006077, AL021394, AL021877, U67831, AC004859, L47228, Z99128, AC002312, AC005291, Z82198, AL050306, AC005702, X55922, Z95113, AL109657, AC007386, AC000379, AC005520, U67825, AL109985, X55924, AP000501, AC005251, AC005971, AP000230, AC002300, AL049759, AP000144, AL078593, I51997, AC006045, AL034350, AC006101, AF008191, U40455, A133243, AP000509, AC005159, AL049830, AC012627, AC004678, AL021546, AC007690, AL050332, AL035414,

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HCDMA20	2587	669201	1 - 331	15 - 345	N62789, N62508, AI289289, N62494, AA936576, R52810, N49008, Z39305, R17666, F02223, H11727, R51380, N93902, and AL119444.
HCBND03	2588	922388	1 - 864	15 - 878	AI702961, AI630765, AW341780, AA931671, AW452292, and U46356.
HCBMZ07	2589	951788	1 - 345	15 - 359	N30431, AA579184, AI791610, AA176605, F19258, AW438916, AA015691, AW265654, AI305766, AW157005, AI028510, AI620585, AI565245, AI783911, AA772016, AA879053, AA992126, H79308, AA904137, W21392, AA128757, AA947837, AA077817, AA657835, AA230143, AA743811, AI090334, AI051037, AI982634, T40612, F29989, AL043098, AA865262, AL039309, AI244254, AI709174, AI358071, AW274197, AI821467, AA054106, AA300061, AI951436, AI499094, F31654, AI358229, AA226584, AW406755, H72688, AI365988, NS2796, AA747243, R85717, AW339687, AW069807, AA629702, AI635272, AA743956, AL049610, AC002350, AC009396, AP001138, AF067846, AL049633, Z83819, Z98051, AC002418, AC005412, AL031774, AL031393, Z72521, AP000691, M87914, AC002369, AL031846, AC007304, AC005164, AL033381, AC006160, AC004651, AL109627, AL022313, AP000011, AP000152, AF140763, AL009172, AL021918, AC004904, AC005940, AC001066, AC006254, AC004386, L81893, AC004381, AC004231, AC002425, AC005736, AP000348, AC006539, AP000045, AC007736, AL050333, Z83843, AP000114, AC005971, AP000503, AC008134, L35681, AF001552, AL049856, AL121655, AC004019, AC002316, AC005832, AL133245, AL008731, AC004983, AC007226, AC004882, AC007055, AC005914,

HCBMY10	2590	961718	1 - 478	15 - 492	<p>AC005390, AC007450, AB023052, AL031673, AC002059, AC004388, AL031053, AF148319, AC005578, AC004167, AC009510, AC005003, Z84480, AP000047, AC006409, AP000557, AL109980, AF196779, AC009516, AC003101, AL109628, AL096791, Z83840, AC002558, AL022578, AC004253, AC006381, AF091512, AC006037, Z85987, AC005062, AL021392, AF053356, AC004594, AC005365, AC006077, AL031005, AL096699, AL031391, U91321, AC005796, AL050307, AP000556, AP000513, AP000115, AL031662, AC012099, AF061325, AC005703, AC007514, AC001530, AC005484, AP000356, U14702, AC012384, AC005907, AL022143, AP000308, AP000048, AC004699, AL049745, AC002295, AL080317, AC006552, AC004027, AC003982, AF147277, AC002565, AL033518, AC012627, AL021395, AC006948, AC005838, AC005212, AC006011, AC004087, AL031770, AC000041, AC020663, AL137434, AP000690, AJ003147, AC004678, AL049588, AC007263, AL096701, AC005785, AC004134, AC002487, U63834, AP000502, AP000517, AP000032, AL049694, AL121825, AL109799, AC005837, Z84572, AC004460, AL021878, AC005089, AC004453, Z70289, AC005406, AC008394, AC007676, Z85999, AC006057, AC005972, AC007041, AC004963, AC003037, AC007536, AC007308, AF106656, AC004988, AC004805, AC003954, AC005399, Z85996, AC005366, AC002470, AC005839, Z81369, AC005808, AC004832, AC004263, AB023054, AL049828, AL035422, AC005071, AC005523, and AC006166.</p> <p>T53770, AW069769, AA487272, AL612070, AA582073, AA832175, AL611533, AA760808, AA508359, AL037771, T11828, AL252274, AL732378, AA559241, AA503475, AA527602, AA531079, AA493708, C18840, AA469451, AL133297, AA828802, AA828781, AW021583, AA640685, AL439910, AL270117, AA527727, AW276935, AW023990, AL382825, AL038705, AL561060, AL282479, T29611, AA601642, AA602954, AA809546, C18521, AL950671, AA955031, AL687343, AL434695, AA477122, AL754955, AA515905, C18521, AL950671, AA955031, AW021917, AA503258, D82454, AA458703, AA908285, T07039, AW022834, AL933714, AA846935, AA569471, AA548058, AL732151, AA587516, AA502155, D83989, AL135744, X54171, AC008015, AC002091, AC004263, AC005412, X54175, AC004859, AC002302, AC005387, AL022326, M37551, AP000512, AL109798, AC006509, X55926, AL035658, AC004900, U67829, AC005619, AC005399, AC004883, AC004837, AC004893, AC005736, AC006036, AC005971, AL034420, AL031311, AC002352, AC005914, X54178, AC007395, AC004231, Z93241, AP000349, AC006468, AC006023, AC005480, X54181, AL096763, X55933, Z84719, U18399, AL079304, AL022726, AC006115, AC004149, AC004821, X75335, AC005296, U18394, AC004963, AC006285, AC005303, AC007731, AC005500, AC004999, AC000134, U66059, AL031279, AL031680, AC004386, AL034582, AC007199, AC007263, AC006530, AC006539, Z84480, Z83844, U18391, U18395, Z82173, U95743, AP000334, AC007386, AL096776, AC004230, AC005568, AC005184, AC004655, AC005057, AC005484, AL022165, AL239321, AL031683, U18396, AC005368, AC004474, AC007226, AC002312,</p>
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HCBMG11	2591	965394	1 - 685	15 - 699	AL1680459, A1022295, R25336, A1917581, N76313, and AA478089.
HBZSK04	2592	926407	1 - 65	15 - 79	
HBZSG02	2593	920249	1 - 414	15 - 428	
HBZSD32	2594	699335	1 - 415	15 - 429	A1733802, A1733182, AA948110, and A1261960.
HBZAI73	2595	764479	1 - 489	15 - 503	
HBZAI26	2596	681879	1 - 640	15 - 654	R84573, R88849, H50890, and X69908.
HBZAI39	2597	847621	1 - 1325	15 - 1339	W93922, and AF080623.
					T56623, T57310, A1499938, AA601218, A1679782, A1284640, AL043009, AL046409, A1963720, A1334443, AA610491, AW303196, AL079645, A1431303, AW301350, C75026, AW193265, AA630362, A1471534, A1270117, AW406755, AA521323, AA631507, A1471543, AW327868, AA669840, AW274349, A1350211, AW419262, A1860020, A1345681, A1345675, AA394271, AL119691, A1567076, A1912322, A1613280, A1732120, A1206785, A1683577, A1569086, AW243960, AW088846, A1143242, A1469624, A1005388, AL042856, A1312309, A1358229, A1262909, AA680243, AW338086, AA521399, AW131249, AW439558, AW276827, AW408717, AL048925, A1469968, AA584752, AW069481, A1061334, A1471481, AW270270, AA682912, AL042420, AL138455, A1537955, A1561060, A1281881, AA491814, A1371070, A1571512, AA127353, AL042753, A1298710, A1345654, A1937850, AA569471, A1151261, A1619997, A1623898, A1688846, F36273, A1336660, A1085719, AW167267, A1049634, A1053672, AW167372, AW193432, A1365988, A1079910, A1286356, AL044940, AW406162,

AL041706, AA133986, AW407578, AI148277, AL138265, AW023672, AI375710, AL037683, AI110844, AI670124, AI865905, N35896, AI357551, AI954260, AA074130, AI110770, AI754658, AA649642, AI635818, AI282832, AA490183, AW162489, AA714453, AW406659, AI110760, AI434695, AA780515, AI287651, AI435544, AI344844, AA350859, AI801591, AI053786, AI043719, AW276817, AI305547, AA226153, AI744995, AI859742, H71429, W79504, AA192740, AW410400, AI951863, AW073470, AI119984, AW247819, AL041690, AI610920, AW276435, AI640702, AW021917, AI888752, AA178953, AI610159, AI279165, AI358343, AI038833, AI761471, F29989, AW339568, AW302013, AA587256, AA713815, AL120687, AI590689, AI590958, AI355224, AM99503, AA226715, U95742, AC007216, AC006948, AC007066, AC007055, AC002115, AC007387, AL022323, Z94721, AP000135, AL023284, AJ003147, AC004463, AC005620, AL022237, AC007664, AL049569, AC005041, AP000031, AC005696, AC002472, AC002375, AC012384, AC005488, AF067844, AC006014, AL034423, Z82244, AC003689, AL049780, AC007242, AC004974, AL031680, AC005104, AC002119, AL031311, AP000044, AP000112, AC005914, AC005971, U47924, AF196779, AC005182, AC010349, AJ246003, AC005217, AC003101, AL035417, AC006064, AC007279, AC005527, AC005412, AL121603, Z84488, AC005043, AL121655, AC004000, AC006251, AC005902, Z74617, Y07848, AC006271, AC008009, L78810, AC004967, AL049709, AC002565, AL133382, AC002059, AC005619, AC004125, AL110502, AC004491, AL031075, AC005932, AC005529, AL121658, AF049895, AC004776, AC004686, AC004061, Z68276, AL031668, AC005399, AL021707, AL021546, AC004858, AC000026, AC005356, AL031673, AC015853, AC007011, AC005280, AL022322, AC005786, AC007240, AL133445, AC004963, AC005076, AL132985, AC005300, AC006449, AF002223, AC006019, AC018633, AC007546, AL008715, Z49236, AF135028, AC002316, AC008372, AC005531, AC000025, Z97989, AC006480, AL096791, AC002301, AF217403, AC004526, AC004020, AC005231, AL132712, AC005520, AC004703, AC006030, AC005330, AC008044, AC004841, AL035079, AC005832, AL035685, AP000503, AL031733, AC000159, AC005486, AC005618, AC008115, AC003003, AL133353, Z97054, AL035422, AC004539, AC005291, AC000052, AL133245, Z81450, AC007192, AC004652, AF129756, Z82202, U78027, AC005202, Z86061, AL109798, AL031588, AC004382, AC004585, AC006112, AF109907, AL034429, AC006130, AC004019, AC005015, AC004659, AF107885, AL078477, AC007040, AF165926, AC004876, AC004181, AJ251973, Z85987, AL121652, AL031255, AL021391, AC005740, AC004236, AC004990, AL133371, AC006441, AL022328, AC008014, AC002045, AC005071, AC006160, AC005764, AL008718, AL035072, AC002364, AP000477, AC004816, X60459, AP000297, AP001172, AL035587, AC003678, AC004883, AL031848, AC004030, Y14768, AF134726, AL050306, AL020993, AC002425, AC005784, AC005480, AL031602, AC004217, AC006965, AC005355, AL034452, AF000692, AL009179, AC005057, AC005899, AC008101, AC000072, AC005664,				
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HBZAI14	2598	847620	1 - 512		15 - 526	AA079443.
HBZAB15	2599	660348	1 - 413		15 - 427	
HBZAB08	2600	959560	1 - 449		15 - 463	AI806340, AI347581, AW058265, AI149706, AA858304, AA416860, AA910678, AA470052, AI674598, and AA887474.
HBNBQ50	2601	887096	1 - 604		15 - 618	AA481928, AW370602, AA130551, AA410947, H02520, AA477170, AW362159, AW362184, AI683337, AI151512, AW362163, AW024950, AW362162, AA295138, AW364082, AA434486, AI346658, AI247124, AA434390, AI560635, AI922390, AW193870, AW261977, AI813439, AW050855, AW272323, AI889939, AI633003, AA913117, AI917569, AA862055, AI819001, AA559250, AI589941, AI356811, R72882, AW304202, AI627873, N94336, AA480065, AW130311, AI889450, AW083447, AI631391, AI081435, R93337, AW074375, AW027034, AA527492, W49844, T40555, AI673235, AA010655, H00902, AA211365, AI824358, R66066, AW297543, AA863216, AA568472, AA872583, AA740278, R16077, AW070819, AA877152, AA130587, R72869, AI349088, R72008, AI682945, AI922396, AI682950, AA533970, AA047596, H00901, AA010656, R72471, R15713, R67665, R73357, AI890961, AI801834, AA745829, R73342, AW337286, AW384044, X14856, and A08001.
HBNBO30	2602	430360	1 - 442		15 - 456	H41301, R36910, AA894644, R87213, H15246, T23507, AI222616, and AB002320.
HBNBL29	2603	703113	1 - 397		15 - 411	R18010, AI680708, and AI635217.
HBNBJ29	2604	907015	1 - 320		15 - 334	AA935421.
HBNBJ06	2605	960664	1 - 284		15 - 298	AI369384, and AA719568.
HBNBB41	2606	712676	1 - 601		15 - 615	H95264, AI680749, AI672415, AI492506, AI633630, AI628076, AA699651, AI090129, N73745, AI434427, AI480111, AW088604, AA988606, AA917930, AA236877, AW300229, AI942393, AI271713, AI627960, AA701995, AI911527, AI693888, AI765976, AA424737, AI984791, AI672498, N38876, AW300532, N66066, W86671, AI478472, AW271444, AI540292, AI350589, AA505970, AA724554, AA905114, AI141611, AA625745, AI623282, AA677788, AI758154, AA553728, AW243369, AI915897, H39811, AI038544, AA904754, F28995, AA953543, H78001, T69270, T67436, H24986, AA235920, Z19235, AI927054, R08315, H81259, T99814, H26910, AI341446, R05488, R05808, C21030, and H39812.
HBNBB27	2607	600905	1 - 130		15 - 144	
HBNBB09	2608	868924	1 - 360		15 - 374	R42401, H17978, AA412292, AA470014, AA632915, AI147693, AI347038, AI308941, AA135185, AA583432, AA836857, AA018749, AA299011, AA528216, AA516435, AA916348, AA514541, N62509, AI350971, AA494556, and AF184971.
HBNAW73	2609	764716	1 - 285		15 - 299	AI190941, R86172, H25501, and Z99289.

HBNAC74	2610	586797	1 - 140	15 - 154	AA318750, AA482345, AA281903, AA305550, AA975640, AW411095, AJ130978, and AF099149.
HBNAC71	2611	525831	1 - 305	15 - 319	
HBNAC48	2612	721983	1 - 338	15 - 352	
HBNAC42	2613	714263	1 - 408	15 - 422	AA078532, AC006014, AC005488, AC005049, and AL009172.
HBNAC32	2614	526549	1 - 206	15 - 220	AA190822. C14348, AI074047, AF007887, AI078283, C14340, N63997, N62637, AI457357, C14382, AI299045, D25956, AW339264, AI347344, AW135793, AI952780, AI337314, AW166959, AI080011, R81679, AW089495, AI440133, AI521589, AA581403, AI634350, AA836392, AI671661, AI281867, AL046227, AW073858, AI832245, AI636588, AL037582, AL037602, AW022682, AI610362, AI817545, AI824746, AI613038, AI583578, AI612913, AI249946, AW023338, AI860897, AW007555, AW161202, AL039730, AI470293, AW087199, AI305745, AI635892, AW132034, AI434969, AI245008, AI628325, AI817373, AI440284, AI289310, AI682891, AI687568, AI432570, AI288285, AW327527, AI538850, AI277008, AI690813, AI285514, AI471898, AI918634, AI933992, AW088944, AI452560, AW265004, AW198112, AW020358, AI491904, AI621341, AI631107, AI699211, AI623941, AL043089, AI954080, AI889148, AL038529, AI587302, AW150308, AI679550, AI678688, AI287446, AW090387, AW058233, AI862135, AL119457, AW264727, AI587156, AI926041, AI005511, AI682968, AI921633, AW166870, AI476109, AI912434, AW411043, AI934011, AI890051, AI446511, N25033, AW085709, AA814990, AI241741, AW167157, AW366372, AI758988, AI783569, AW194014, AI885999, AI922315, AW161098, AW167926, AI635016, AW026905, AI270039, AI862139, AI929108, AI885982, AW089233, AL121041, AI918408, AI696846, AI537076, AI584130, AI469516, AI698391, AI250627, AI623682, AI683634, AI680498, AI961589, AI828568, AI493567, AI963191, AA848053, AI620639, AI589428, AA693314, AA514684, AI933001, AI890391, AI818562, AI683497, AI269580, AW089387, AI624548, AI927233, AA856697, AW084151, AI697372, AW169234, Z98519, AL048644, AI537187, AI828734, AI361701, AI435253, AW079432, AI918554, AI457188, AI609556, AL120987, AA760655, AI499621, AI884459, AW080076, AI701975, AW268122, AI924686, AI687168, AW118414, AI280561, AA768369, AI363957, AI572017, AI783504, AI282669, AW075608, AI922689, AI374987, AI633061, AI554344, AI802542, AI571529, AI702527, AF113694, AL035458, AL021393, AL035587, AC005091, AC004383, AC004987, AL034400, AL031346, AC007358, AL031984, AC004822, AL137705, AC002287, AL049761, AC004797, AC004943, AC005291, Z99297, AC005225, AF042090, AP000697, AL121603, AC007390, AC007172, AP000514, Z82206, AC005876, AC005250, AC002471, AC005374, AC000053, AP000340, Z49258, Z83840, AC006313, L78810, AL049776, AC004470, AC002467, AC006501, AF095901, AC004686, AP000250, AP000133, AP000211, AP000030, AL034417, AC004213, AC002060, Z98949, AL022165, AC004227, AC007384, AC006039, AL009179, Z83844, and AI035407.

HBNA28	2615	525832	1 - 307	15 - 321	AC007539.
HBNA25	2616	525834	1 - 132	15 - 146	
HBNA09	2617	525833	1 - 63	15 - 77	AA604441, AI690219, AI693458, AA508848, AA447094, AA830382, AI703075, AW003969, AW189292, AW014124, AA831149, AI278956, AI922983, AA908927, AI703009, AA455884, AI870286, AI160778, AI873461, AI636871, AI245433, AP000504, and AF129756.
HBNA02	2618	921187	1 - 187	15 - 201	
HBGT76	2619	903653	1 - 819	15 - 833	H62649, AA584581, AA059154, AL043721, AA098922, AA593060, AA443390, AA329321, C18357, C18360, M77895, AA115968, AA365302, AA58235, AW088224, AI921188, AA601270, N43757, AA634855, AI286356, AL138455, AL043756, AA515224, AW117750, AI357551, AI307201, AA630352, AA084070, AI921649, AI929531, AI064952, AI376100, AW162049, F13749, AA665293, N25303, AA655002, AA641103, AL009179, AL096775, Z70688, AL022324, AL034419, AL022318, AL078581, AC005962, D87717, AL035696, U95742, AL049829, AC007068, AC005664, AC000052, AC004019, AF190465, AC004712, AL023494, AL109627, AL035460, AP000512, AC007022, Z82208, AL122020, AC004797, AC004622, AC006332, AC004477, AL031005, AL008582, AL008721, AC004859, M87923, AC005663, AB023051, AC007686, S42659, AC007225, AC004933, AC005406, AC002287, AC005783, Z95114, AL049776, AL035681, AC006138, AC002119, AC005618, AC004027, AC006596, AL034548, AL049875, AC005358, AC005911, AF111168, AC005725, AC005288, AC007546, AC006576, AP000513, AC004526, AC004671, AF072099, L27148, AC004695, Z82188, AP000270, AC000087, AC004972, AC004927, AP000351, AP000131, AP000209, U66059, AL031848, AC004638, AC000120, AL078477, AL008629, AC016026, AP000248, Z98036, AL031782, AC006480, AL133448, AB016897, AL117258, AL023807, AP000032, AC007690, AC004517, AL031296, AC005324, AC005696, AC006211, AP000349, AC007845, AC005081, AL022163, AC004035, AL034420, AC005362, AP000049, Z82178, AP000134, AP000212, AL031291, AP000311, AC007283, AC005808, AL023553, AL031591, AP000080, AL031846, AC006409, AL109628, AC004522, AC007676, AC004890, AC005104, Z85996, AC002115, AL022311, AC006132, AF165926, Z97205, AC006285, AC005342, and AF196969.
HBGTE11	2620	965121	1 - 313	15 - 327	AW015800, AA251013, and AF037222.
HBGQS88	2621	886650	1 - 436	15 - 450	AW304683, and AC004152.
HBGNL85	2622	848179	1 - 692	15 - 706	AW104050, AA738352, AI953035, AI341184, AA995803, and AA911220.
HBGND04	2623	926973	1 - 582	15 - 596	AI057634, AW182951, AI655334, AA854636, AI218588, AI457916, AA961245, and AA953084.
HBGMT82	2624	954374	1 - 495	15 - 509	AW007399, AA782657, AI673493, AW104963, AI539419, AI970048, AW272491, AI827847, AI707847, AI201450, AI160580, AI149344, AI719374, AI870582, AW068652, AW131835, AA022523, AI142042, AA689495, AI394166, AI197831, AI452812, AA536006, AA483525, N24911, AI220974, AA994188, AA687451, AA745895, AI808412, AI475847, AA687509,

HBGMS69	2625	754392	1 - 438	15 - 452	AA733114, AA480131, N78953, AA380438, AW246627, A1749023, A1382254, AA524482, F22287, AA053148, AA689552, AA405870, A1190107, W17347, A1245397, AA482098, AA622680, A1458806, A1143698, AW084279, AA113160, AW304748, AA977756, A1589259, A1917965, A1061434, AA576098, AF096303, and AF024631.
HBGMO78	2626	773043	1 - 474	15 - 488	N78741.
HBGMG81	2627	880276	1 - 678	15 - 692	AA417275, AA421555, A1863143, AA460243, A1491842, A1540501, AA831948, A1082645, A1969655, A1864102, A1355990, A1923989, A1564629, A1036705, A1924051, AA642437, AA804776, A1567883, AF070643, U02475, A137258, and A137254. AA974503, A1986165, A1079812, AA287570, AA255853, A1129446, A1043009, AA866015, AW237905, AA653154, AF039185, A1755214, H96249, A1754105, A1754567, A1656840, AL079734, A1476049, AA488903, H07953, AA521399, AA521323, A1369580, AA013168, AA054085, A1380617, AW419389, AW265385, T74524, AA019973, AW069769, A1110844, AA443390, AL043718, A1431303, AA442528, A1358712, AW419262, AA167792, AA489204, AA613203, A1733856, AA833875, AW023111, AA833896, AA826669, AA491284, A1675615, A1821714, A1792133, A1791913, AA665330, A1815210, A1612142, A1609972, AW271904, A1150401, A1923052, AA769402, AW327868, AW003886, A118991, R43310, A119838, AW245747, A1436433, AA719073, AA191418, AA847499, AA682912, A1917132, A1696878, A1792521, AA410788, AA613232, AW021917, AA630362, A1582769, AA563733, A1247101, A1821785, A1732151, A1583252, AW303196, A1687343, A1610941, AL044940, AA480772, A1003972, AA502532, AW026305, A1421950, A1345654, AA669840, AA530958, AW408717, AW270385, A1419337, AW270771, A1963720, AW193265, A1754653, A1056177, AA613227, AA829036, AW020088, AW301350, AA659324, AA581903, H73550, AW265688, AW020150, AL046205, AL042756, AL038705, AA569667, AA714110, AA579179, AA128592, A1345157, AA714011, A1270117, AA468022, AA631507, A1879951, AC007349, AC004913, AL023803, AP000088, AL121603, U85195, AC005291, AC005527, AC007687, AP000557, AE000658, AC005529, AC005694, AC000052, AC007488, AL078593, AL021155, AP000355, AC000025, AL132712, AC005411, AJ010770, AC004167, AP000501, AF088219, AC004686, AP000503, AL008627, AL031255, AC000353, AC004019, AC004638, AL078463, AC005355, AC002369, AL096774, AC005225, U96629, AC006480, AC004812, AC020663, AL021918, AL133448, AP000505, U91319, AL031659, AC004228, AL133243, AC007536, AC002350, AC002565, AC002347, AC002045, AC006965, AC006285, AC006064, AC005015, AL035089, AP000044, AP000112, AL009181, AC005274, AC006211, AL008718, AF196779, AL023807, AC008040, AF045555, AP000114, AP000046, AL022323, AC005778, AC005488, AC005531, AC004941, AL121652, AC002470, AL031311, AC006126, AC005799, AL035072, AL022326, AL034549, AP001051, AC005859, AL022322, AC007664, AL031668, AC003684, AC005899, Z95152, AL031283, AC007225, AC006449, AL050318, AL121655, AC005996, AC005318, AC005378,

					U80017, AC005231, AC003101, AC005900, U95742, AL031848, AC006511, L78833, Y14768, Z99716, Z81314, AC002395, AC002316, AF139813, AC002314, AC005295, AL109628, AC005086, AC005701, AC007216, AC006388, AC007308, AC006000, AF001549, AC005519, AC005988, AC005837, AC005756, AC002549, AL023553, AC006111, AC002301, AC004815, AC005207, D88270, AP000245, AC005031, AC005747, AC005088, AC011311, AF030453, AC007731, AC007666, AJ246003, AC007686, AC007384, AL133244, AC002310, AC009247, AC007919, AC007227, AC006130, AC005914, AL078623, AC004797, AC005911, AC005280, AC007395, AL021707, AC005500, Z99128, AC005324, AC007546, AL031427, AL049759, AL034420, AC009516, AC005562, AC006057, AC004526, AC003029, AL050341, AL049748, AC005154, AL096791, AC006213, AC005250, AL049869, AF129756, Z83838, AC002504, AL020997, AC006312, AC004675, U62317, AC006277, AC005399, AC006468, AL109865, AL031662, AL021368, AC004990, AL109827, AP000031, AC002429, AL035417, AC003983, AL024474, AC005206, AC005393, AC003080, AC004878, AC004805, AL035455, U47924, AC007262, AP000504, AC005874, AF134471, AC006252, AC004020, Y07848, AC003006, U91321, AC006023, AC005412, AC005043, AL022312, AC004106, AC004883, AP000692, AC006236, Z98742, AC004659, AC000026, AC007066, AC005783, AC007637, AL035681, Z83844, AL050312, AC007450, AC005184, AC007242, AC005696, AL109984, AC005484, AC007993, AP001037, AC005520, AL121653, AC005011, AC004033, AC005667, AC004584, AC004988, AL121658, AP000553, AL031670, AC006430, and Z85986.
HBGFS88	2628	914032	1 - 628	15 - 642	AA778429, AI563955, AA928041, AA626794, AI871136, W44486, AA071274, AI126250, AA902119, AA029458, AI814680, N70230, AI340231, N67040, AW074273, AI417119, AI027942, AI343619, AA644262, AI080252, AI804089, AA865354, AI186469, AA496355, AI753118, AI868721, N63928, N71035, AI336036, AA861853, AW262673, AA205643, D60248, AI524080, AI969141, AI755095, AW249740, AI955645, D60466, C00015, N98454, AA496405, D60550, AI659597, AI383091, N79606, AI187029, AA128493, D60009, AA512988, AA128352, H94297, AA626779, AI357512, H95828, C14688, T70086, AA649543, AA595243, AI368586, AW022016, T47633, AI672897, AA029523, R73069, AA693672, AA991733, R94710, T83736, AI418701, AW028373, R23240, AI538371, AI954235, AI623761, D81788, AA205642, W01019, AI954237, H94191, AI382863, R33837, AA364340, AA094118, R94790, D81287, W44485, R23316, W19084, N41706, D60973, T70157, R81247, T83907, AI910652, D60249, D81466, AA093704, D60551, AA354560, R33836, R81248, W01933, AI683085, AA383533, T47632, AA093663, H57883, AI355051, and AC005369.
HBGFG53	2629	727748	1 - 461	15 - 475	AA419551, AW292148, AI791628, AI821482, and AL137722.
HBGDH33	2630	702854	1 - 458	15 - 472	AI399653, AA453794, R44976, H06251, R60067, AI278851, AA528243, AA973793, AA453879, R44717, and Z40655.
HBGDF39	2631	861602	1 - 341	15 - 355	D59582, and D59820.

HBGDA74	2632	832888	1 - 474	15 - 488	AI565755, AI342368, W76561, AA780301, AI200880, AW195697, AA451937, W23209, AA364898, AI050849, H39591, AI028147, AW293972, AI474504, AA324713, AI628717, AA961641, N24530, AF071749, AF136279, AF071748, AF132894, AF088886, AR016587, AL137742, AJ007331, and E15813.
HBGBG69	2633	802090	1 - 43	15 - 57	R60478, R11939, AI140927, AW166520, AI097082, AI378818, AW070736, AA022937, AI417973, AI278239, AA813598, AW024249, AI143513, R02801, AW024258, AI097158, AI217615, AA128646, AI831140, AA151765, AI48969, AW058275, AI273856, AI537960, AI310767, AA012905, AL048340, AI952433, AI348854, N22406, AI335235, N20984, AA808904, AI860833, R49697, AI673140, AI810317, AW075382, AL047422, AI288076, AI499104, AI539690, AI473554, AL117403, AF115410, U58996, U68233, I92592, AC005902, AR068751, AF100781, AF213396, Y10080, AL117583, AC004227, AC006288, AF013249, AL133081, AF026124, AF181849, AF181850, AI5345, AL080124, AC005221, AR066486, A70386, AF161699, AF082526, AL049300, I80064, D44497, I08608, AF000301, AF137367, AR023871, AL050310, X56530, and AL110222.
HBGBG52	2635	522424	1 - 245	15 - 259	T71030, AA747777, AA381858, AA668902, AA558060, T90248, AA934680, AA059235, T70174, AA678436, H86264, AC006001, AC002350, AL021546, AC006449, AC006026, AC003102, AC004895, U18671, AC005387, AL133246, AC022517, AC005696, AL021939, AL035072, AC005089, AC005694, AL050333, AC005565, AL121603, AL135744, AC005839, AL008582, AC006960, U95742, AC006277, AC006071, AL022302, AC006241, AL031681, AC005295, AC005004, AC005899, AC002312, AC005785, AL049776, AC002310, AC004253, AC007666, AC006530, AC004859, AC000353, AJ003147, AC004858, AC005081, AC002126, AF196969, AC005231, AC004966, AL035587, AF109907, AC002470, AC005015, AP000688, AC005829, AC004383, AC005529, AC005940, AC004491, AL022322, AC007216, AC004019, AC006064, AC004030, AC007055, AL034420, AC005288, Z83840, D00591, AC007308, AL023803, AC005011, AL049757, AC005776, AC005102, AC007021, AL034423, AP000692, AL109847, AF017104, AP000503, AC002347, AL035659, S77605, Z99716, AP000556, AL031005, AC002369, AL079340, AC007917, AL049780, AC004228, AC005944, AC005971, AC004770, AC004804, AC006312, Z98950, AC002128, AC005527, AC002073, U91326, AC007193, AC002116, AL008718, AC007421, AC002477, AC007637, AF001549, AC002072, AF003626, AC005218, AL121655, AC005500, AL035071, AC003689, AC005622, AL022318, AL050318, AB003151, AL096707, D26535, AL096701, AL022323, AL034350, AC005535, AC004876, Z83820, AC007066, AC007283, AP000115, AL133371, L78810, AC009516, and AC002316.
HBGBG38	2636	525837	1 - 137	15 - 151	
HBGBE12	2637	971466	1 - 94	15 - 108	

HGBB78	2638	773930	1 - 329	15 - 343	H51141, and D37934.
HBCPV80	2639	932817	1 - 390	15 - 404	AI306162, AI492835, AC002359, and AC002365.
HBCPO75	2640	927520	1 - 473	15 - 487	AI017490, AI221329, AA973064, AA813611, AI688144, AI222206, AW182987, AA883877, W31185, AI208514, AI917508, and AI810095.
HBCPK03	2641	922493	1 - 720	15 - 734	AA831288.
HBCJP02	2642	917981	1 - 494	15 - 508	AI188098, AW304309, AI375434, AI625524, AI016723, AI167974, AI302664, AW001092, AI246687, AI572643, AI201622, AW151711, AW167729, AI609516, AI687735, AI191064, AI289182, AI191358, AI024836, AA632308, AI831665, AI084459, AI088322, AA242818, AA580006, AI888580, AA011305, AI870130, AW168685, AA010915, AW078807, AI372084, AI217609, AI200991, AW237859, AI263564, AA629134, AI720347, AA862783, AI880912, AA564376, AI879913, AI367291, N74110, Z21520, AA028965, AI349340, AA298576, and AI582057.
HBCJG07	2643	951898	1 - 375	15 - 389	R82747, R30969, and T87286.
HAUCC58	2644	764851	1 - 390	15 - 404	AA235095, W63805, W07740, AA302624, AA293831, AA315199, R53208, AI568567, AI992241, AI086596, AW151172, AA309877, AI080304, AA401651, AW090277, AA150647, AA708776, AA142944, AI826693, AA843315, N77987, AW051448, AA527053, N92512, R87425, AI129519, AI031868, AI083531, AI335895, AI039605, AI299184, AI200329, AI148099, AA788733, AA115544, AA389673, AW337779, AA588191, AI141373, H66602, AI192219, AA708520, AA079352, AI076910, AA872411, AA860813, AI160688, AI805893, AA455203, AA769806, AA411491, AA436345, AA493343, AI193844, AI421247, AI167692, AI074899, AI193867, AA249309, F32557, AA722032, N80680, W38964, F24549, T83037, AA402479, AA844466, AI141356, N58395, AA454862, AI161139, AW008542, W93969, W93970, AA336147, R48412, AI378335, T90357, H95941, AA568295, R86694, AA341105, AA228455, AW352337, W30921, AW337638, N74117, AA303783, AA215973, AW009811, R53110, AA558040, AI961636, F24945, AA715148, R49774, F35088, AA228454, AA328964, AA077962, R11503, H87636, AI695590, AA904185, AA398459, AI803601, R86695, AA115055, AA192729, AA889647, and AF151893.
HAUAW51	2645	577959	1 - 336	15 - 350	AA214667, and H78996.
HAUAS89	2646	518847	1 - 164	15 - 178	AA976970, F27522, F30071, AA096277, AA627396, F33364, AA318284, AI283651, F27676, AW015956, AA947143, AA244132, AA327732, AA352731, AA320725, AA089891, AA317435, AA319168, F30100, AA664996, F29754, F27644, F27760, AI832645, F24555, AI560279, AA306681, AI749712, AI289147, AI130748, AA694164, AI023676, AA244131, F26815, AI039009, F33405, AI309287, AA534561, T74859, F35771, F34894, F35313, W78719, F30920, AA694524, AA524049, AI150756, AI344732, D51606, AA903996, AA864997, AC008044, and AC008372.
HAUAQ28	2647	685374	1 - 520	15 - 534	AA127594.

HAQCF25	2648	678235	1 - 513	15 - 527	T63571, AI8322218, T63496, AI004915, AI990727, AW381879, AW381818, AW381815, AI254648, AI917020, and AL137725.
HAQCD07	2649	958959	1 - 439	15 - 453	AI142585, AI082139, AW051999, AA833602, AA719280, AA703255, AI870257, AI952791, AA625853, AI125671, AW104742, AA813022, R44512, AA928937, AI826007, AI921451, AI272168, AL120554, AI928736, R48258, AI453416, AW104741, AI933170, AA350537, T98866, AA364915, T40772, AI784134, AA053022, AA740797, AA350621, AA340417, AI240679, AA308837, H16246, AA053159, AA907088, N86840, AW401390, AI939391, AW071136, H30533, R37449, R37338, AC005781, and AC005581.
HACMR08	2650	955638	1 - 485	15 - 499	AI292236, AW265393, AI123080, AW069769, AI042373, AW069227, AL038936, AI040051, AW438542, AI216990, AL079734, AA402129, AI887235, AI674946, AA501461, AI733856, AI755214, AW303196, AA469327, AA502532, AW301350, AL120343, AI754105, AA515728, AI754567, AW274349, AI821714, AI792133, AI791913, AW265090, AW270258, AW088846, AW021015, AW237905, AW072923, AW302315, AI354423, AW103509, AW341903, AI859946, AI821785, AA653139, AW270270, AL040054, AA613627, AI696962, AI357823, AL042856, AW407578, AA602906, AI801482, AI267356, AW270619, T67090, AI753488, AI281881, AA582554, AW021917, AA634837, AA715814, AI267450, AI874341, AA704393, AL045709, T74524, AA644090, AI754037, AA584489, AI969436, AA631507, AI282253, AI054333, AW410354, AW277174, AA470344, AA533025, AW117740, AL044858, AA284247, AA595499, AI473943, AI278089, AW302711, AW270768, AA764783, AI889440, AI275982, AI687343, AI081147, AL042756, AI368256, AW190505, AI291037, AW327624, H07953, AI244127, AW263864, AI371249, AA525253, AA613624, AW438539, AI792499, AI017251, AA833875, AA833896, AI192278, AI144081, AI380617, AI369580, AI567076, AL079645, AI291823, AA430137, AI110844, AA634786, AW020992, AI064864, AW021951, AA307598, AW021154, AI917132, AA622801, H73561, AI872216, AI109758, AC002301, AC006077, Z68276, AC005089, AL049872, AC006441, Z82182, AC002306, AC007204, AF205588, AP000251, AC005399, AC006262, AP000212, AP000134, AP000030, AC007371, AC002430, AC005808, AC007384, AC004859, AC006006, AC005632, AP000356, AL022721, AC004257, AC005037, AF053356, AL034417, AC005696, AC002119, AC005261, AL034420, AF196779, AC004815, AC004797, AF111167, AC004878, Z85986, AC005377, AC004253, AC002477, AC005901, AC005519, AC004655, AC002492, AL031433, AL035458, AC006317, AC006966, AC004921, AC004895, AC004477, AL022476, AL133448, AC004858, AC005682, AB023049, AC005060, AC000113, AC005179, AF196972, AC005666, AC008372, AC007055, AL135744, AP000065, AC004967, AL024509, AC007216, AC015853, AC002425, AF109907, AL034429, AC002544, AL121658, AC007684, AC007842, AC002347, AC004106, AC007227, AC006487, AC005332, AC005251, AL031228, AC007226, AC007686, AL136504, AF031078, AC004972, AL079340, AC006430, AL033527, AC005701, AF015262, AF165142, AL050307, AC005694,

					AL035410, U85195, AL008627, AF030876, AC005200, AJ229043, AC002039, AC005829, AC004098, AC009247, Z98200, AC004686, AL139054, AC004128, AL021918, AC004099, AC004386, AC003101, AC004552, AC005599, AE000658, AF042090, Z84467, AC003093, AC004448, AC007073, AL033525, AC005255, AC004890, AC005324, AC005578, AL031005, AC007225, AF111168, AC005726, AC005821, AL035587, AC005207, AC004408, AL022327, AC005529, U95742, AC006026, AC004236, AC004150, AC005736, AC007052, AF134726, AC000353, AC003108, AF088219, AL022320, AF129756, Z82244, AP000215, AC004263, AC016831, AC008115, AF146191, AC004659, AL035405, AL021393, AC005899, AC002365, AF001549, AC006101, AL021546, AL117344, Z97056, AL133246, AL034548, Y18000, AC003992, AC004707, AF017104, AD000092, AC007899, AC012627, AC005905, AC004590, AP000505, AC005874, AF134471, AC004796, AL031117, AL109627, AL049643, AL049748, AC005972, AL049873, AP000252, AL133500, AC004913, AL034555, AC006120, D87675, AL135960, AJ131016, AC007277, AC005378, AC005071, AC003070, AC004841, AC004622, Z97352, AC002350, AC006254, AC006511, Z98742, AL031276, AC003110, D63507, AL096701, AC005216, AC004475, AP000349, Z70288, AL031286, AC005409, AC002073, Y10196, AC005520, AC005057, AF064861, AL049843, AC005102, AC004812, AC002418, AC005295, AC002553, AL110502, AF190465, AL121603, AC000385, AC007546, AL022162, AC005730, AC005484, AC004887, AC004000, AL122023, AC005280, AC003043, AC002504, AL031295, AC007537, Z68269, AF015148, AC008044, AB026898, AL109628, and AI420248.

TABLE 4

Code	Description	Tissue	Organ	Cell Line	Disease	Vector
AR022	a Heart	a Heart				
AR023	a Liver	a Liver				
AR024	a mammary gland	a mammary gland				
AR025	a Prostate	a Prostate				
AR026	a small intestine	a small intestine				
AR027	a Stomach	a Stomach				
AR028	Blood B cells	Blood B cells				
AR029	Blood B cells activated	Blood B cells activated				
AR030	Blood B cells resting	Blood B cells resting				
AR031	Blood T cells activated	Blood T cells activated				
AR032	Blood T cells resting	Blood T cells resting				
AR033	brain	brain				
AR034	breast	breast				
AR035	breast cancer	breast cancer				
AR036	Cell Line CAOV3	Cell Line CAOV3				
AR037	cell line PA-1	cell line PA-1				
AR038	cell line transformed	cell line transformed				
AR039	colon	colon				
AR040	colon (9808co65R)	colon (9808co65R)				
AR041	colon (9809co15)	colon (9809co15)				
AR042	colon cancer	colon cancer				
AR043	colon cancer (9808co64R)	colon cancer (9808co64R)				
AR044	colon cancer 9809co14	colon cancer 9809co14				
AR045	corn clone 5	corn clone 5				
AR046	corn clone 6	corn clone 6				
AR047	corn clone2	corn clone2				
AR048	corn clone3	corn clone3				
AR049	Corn Clone4	Corn Clone4				
AR050	Donor II B Cells 24hrs	Donor II B Cells 24hrs				
AR051	Donor II B Cells 72hrs	Donor II B Cells 72hrs				
AR052	Donor II B-Cells 24 hrs.	Donor II B-Cells 24 hrs.				
AR053	Donor II B-Cells 72hrs	Donor II B-Cells 72hrs				
AR054	Donor II Resting B Cells	Donor II Resting B Cells				
AR055	Heart	Heart				
AR056	Human Lung (clontech)	Human Lung (clontech)				
AR057	Human Mammary (clontech)	Human Mammary (clontech)				
AR058	Human Thymus (clontech)	Human Thymus (clontech)				
AR059	Jurkat (unstimulated)	Jurkat (unstimulated)				
AR060	Kidney	Kidney				
AR061	Liver	Liver				
AR062	Liver (Clontech)	Liver (Clontech)				
AR063	Lymphocytes chronic lymphocytic leukaemia	Lymphocytes chronic lymphocytic				

		leukaemia				
AR064	Lymphocytes diffuse large B cell lymphoma	Lymphocytes diffuse large B cell lymphoma				
AR065	Lymphocytes follicular lymphoma	Lymphocytes follicular lymphoma				
AR066	normal breast	normal breast				
AR067	Normal Ovarian (4004901)	Normal Ovarian (4004901)				
AR068	Normal Ovary 9508G045	Normal Ovary 9508G045				
AR069	Normal Ovary 9701G208	Normal Ovary 9701G208				
AR070	Normal Ovary 9806G005	Normal Ovary 9806G005				
AR071	Ovarian Cancer	Ovarian Cancer				
AR072	Ovarian Cancer (9702G001)	Ovarian Cancer (9702G001)				
AR073	Ovarian Cancer (9707G029)	Ovarian Cancer (9707G029)				
AR074	Ovarian Cancer (9804G011)	Ovarian Cancer (9804G011)				
AR075	Ovarian Cancer (9806G019)	Ovarian Cancer (9806G019)				
AR076	Ovarian Cancer (9807G017)	Ovarian Cancer (9807G017)				
AR077	Ovarian Cancer (9809G001)	Ovarian Cancer (9809G001)				
AR078	ovarian cancer 15799	ovarian cancer 15799				
AR079	Ovarian Cancer 17717AID	Ovarian Cancer 17717AID				
AR080	Ovarian Cancer 4004664B1	Ovarian Cancer 4004664B1				
AR081	Ovarian Cancer 4005315A1	Ovarian Cancer 4005315A1				
AR082	ovarian cancer 94127303	ovarian cancer 94127303				
AR083	Ovarian Cancer 96069304	Ovarian Cancer 96069304				
AR084	Ovarian Cancer 9707G029	Ovarian Cancer 9707G029				
AR085	Ovarian Cancer 9807G045	Ovarian Cancer 9807G045				
AR086	ovarian cancer 9809G001	ovarian cancer 9809G001				
AR087	Ovarian Cancer 9905C032RC	Ovarian Cancer 9905C032RC				
AR088	Ovarian cancer 9907 C00 3rd	Ovarian cancer 9907 C00 3rd				
AR089	Prostate	Prostate				
AR090	Prostate (clonotech)	Prostate (clonotech)				
AR091	prostate cancer	prostate cancer				
AR092	prostate cancer #15176	prostate cancer #15176				
AR093	prostate cancer #15509	prostate cancer #15509				
AR094	prostate cancer #15673	prostate cancer #15673				
AR095	Small Intestine (Clontech)	Small Intestine (Clontech)				

AR096	Spleen	Spleen				
AR097	Thymus T cells activated	Thymus T cells activated				
AR098	Thymus T cells resting	Thymus T cells resting				
AR099	Tonsil	Tonsil				
AR100	Tonsil germinal center centroblast	Tonsil germinal center centroblast				
AR101	Tonsil germinal center B cell	Tonsil germinal center B cell				
AR102	Tonsil lymph node	Tonsil lymph node				
AR103	Tonsil memory B cell	Tonsil memory B cell				
AR104	Whole Brain	Whole Brain				
AR105	Xenograft ES-2	Xenograft ES-2				
AR106	Xenograft SW626	Xenograft SW626				
H0008	Whole 6 Week Old Embryo					Uni-ZAP XR
H0009	Human Fetal Brain					Uni-ZAP XR
H0012	Human Fetal Kidney	Human Fetal Kidney	Kidney			Uni-ZAP XR
H0013	Human 8 Week Whole Embryo	Human 8 Week Old Embryo	Embryo			Uni-ZAP XR
H0028	Human Old Ovary	Human Old Ovary	Ovary			pBluescript
H0030	Human Placenta					Uni-ZAP XR
H0031	Human Placenta	Human Placenta	Placenta			Uni-ZAP XR
H0032	Human Prostate	Human Prostate	Prostate			Uni-ZAP XR
H0038	Human Testes	Human Testes	Testis			Uni-ZAP XR
H0040	Human Testes Tumor	Human Testes Tumor	Testis		disease	Uni-ZAP XR
H0046	Human Endometrial Tumor	Human Endometrial Tumor	Uterus		disease	Uni-ZAP XR
H0050	Human Fetal Heart	Human Fetal Heart	Heart			Uni-ZAP XR
H0051	Human Hippocampus	Human Hippocampus	Brain			Uni-ZAP XR
H0052	Human Cerebellum	Human Cerebellum	Brain			Uni-ZAP XR
H0055	Human Umbilical Vein	Human Umbilical Vein Endothelial Cells	Umbilical vein			Uni-ZAP XR
H0056	Human Umbilical Vein, Endo. remake	Human Umbilical Vein Endothelial Cells	Umbilical vein			Uni-ZAP XR
H0057	Human Fetal Spleen					Uni-ZAP XR
H0059	Human Uterine Cancer	Human Uterine Cancer	Uterus		disease	Lambda ZAP II
H0063	Human Thymus	Human Thymus	Thymus			Uni-ZAP XR
H0087	Human Thymus	Human Thymus				pBluescript
H0090	Human T-Cell Lymphoma	T-Cell Lymphoma	T-Cell		disease	Uni-ZAP XR
H0102	Human Whole 6 Week Old Embryo (II), subt	Human Whole Six Week Old Embryo	Embryo			pBluescript
H0111	Human Placenta, subtracted	Human Placenta	Placenta			pBluescript
H0124	Human Rhabdomyosarcoma	Human Rhabdomyosarcoma	Sk Muscle		disease	Uni-ZAP XR
H0144	Nine Week Old Early Stage Human	9 Wk Old Early Stage Human	Embryo			Uni-ZAP XR
H0150	Human Epididymus	Epididymis	Testis			Uni-ZAP XR
H0156	Human Adrenal Gland Tumor	Human Adrenal Gland Tumor	Adrenal Gland		disease	Uni-ZAP XR
H0163	Human Synovium	Human Synovium	Synovium			Uni-ZAP XR
H0165	Human Prostate Cancer, Stage B2	Human Prostate Cancer, stage B2	Prostate		disease	Uni-ZAP XR

H0166	Human Prostate Cancer, Stage B2 fraction	Human Prostate Cancer, stage B2	Prostate		disease	Uni-ZAP XR
H0168	Human Prostate Cancer, Stage C	Human Prostate Cancer, stage C	Prostate		disease	Uni-ZAP XR
H0169	Human Prostate Cancer, Stage C fraction	Human Prostate Cancer, stage C	Prostate		disease	Uni-ZAP XR
H0170	12 Week Old Early Stage Human	Twelve Week Old Early Stage Human	Embryo			Uni-ZAP XR
H0171	12 Week Old Early Stage Human, II	Twelve Week Old Early Stage Human	Embryo			Uni-ZAP XR
H0176	CAMA1Ee Cell Line	CAMA1Ee Cell Line	Breast	Cell Line		Uni-ZAP XR
H0178	Human Fetal Brain	Human Fetal Brain	Brain			Uni-ZAP XR
H0179	Human Neutrophil	Human Neutrophil	Blood	Cell Line		Uni-ZAP XR
H0181	Human Primary Breast Cancer	Human Primary Breast Cancer	Breast		disease	Uni-ZAP XR
H0182	Human Primary Breast Cancer	Human Primary Breast Cancer	Breast		disease	Uni-ZAP XR
H0188	Human Normal Breast	Human Normal Breast	Breast			Uni-ZAP XR
H0194	Human Cerebellum, subtracted	Human Cerebellum	Brain			pBluescript
H0196	Human Cardiomyopathy, subtracted	Human Cardiomyopathy	Heart			Uni-ZAP XR
H0211	Human Prostate, differential expression	Human Prostate	Prostate			pBluescript
H0212	Human Prostate, subtracted	Human Prostate	Prostate			pBluescript
H0244	Human 8 Week Whole Embryo, subtracted	Human 8 Week Old Embryo	Embryo			Uni-ZAP XR
H0252	Human Osteosarcoma	Human Osteosarcoma	Bone		disease	Uni-ZAP XR
H0253	Human adult testis, large inserts	Human Adult Testis	Testis			Uni-ZAP XR
H0255	breast lymph node CDNA library	Breast Lymph Node	Lymph Node			Lambda ZAP II
H0263	human colon cancer	Human Colon Cancer	Colon		disease	Lambda ZAP II
H0266	Human Microvascular Endothelial Cells, fract. A	HMEC	Vein	Cell Line		Lambda ZAP II
H0270	HPAS (human pancreas, subtracted)	Human Pancreas	Pancreas			Uni-ZAP XR
H0271	Human Neutrophil, Activated	Human Neutrophil - Activated	Blood	Cell Line		Uni-ZAP XR
H0294	Amniotic Cells - TNF induced	Amniotic Cells - TNF induced	Placenta	Cell Line		Uni-ZAP XR
H0295	Amniotic Cells - Primary Culture	Amniotic Cells - Primary Culture	Placenta	Cell Line		Uni-ZAP XR
H0310	human caudate nucleus	Brain	Brain			Uni-ZAP XR
H0316	HUMAN STOMACH	Human Stomach	Stomach			Uni-ZAP XR
H0328	human ovarian cancer	Ovarian Cancer	Ovary		disease	Uni-ZAP XR
H0341	Bone Marrow Cell Line (RS4;11)	Bone Marrow Cell Line RS4;11	Bone Marrow	Cell Line		Uni-ZAP XR
H0369	H. Atrophic Endometrium	Atrophic Endometrium and myometrium				Uni-ZAP XR
H0372	Human Testes	Human Testes	Testis			pCMVSPORT 1
H0373	Human Heart	Human Adult Heart	Heart			pCMVSPORT 1

H0383	Human Prostate BPH, re-excision	Human Prostate BPH				Uni-ZAP XR
H0392	H. Meningioma, M1	Human Meningioma	brain			pSport I
H0399	Human Kidney Cortex, re-rescue	Human Kidney Cortex				Lambda ZAP II
H0411	H Female Bladder, Adult	Human Female Adult Bladder	Bladder			pSport I
H0412	Human umbilical vein endothelial cells, IL-4 induced	HUVE Cells	Umbilical vein	Cell Line		pSport I
H0414	Ovarian Tumor I, OV5232	Ovarian Tumor, OV5232	Ovary		disease	pSport I
H0415	H. Ovarian Tumor, II, OV5232	Ovarian Tumor, OV5232	Ovary		disease	pCMVSPORT 2.0
H0427	Human Adipose	Human Adipose, left hiplipoma				pSport I
H0428	Human Ovary	Human Ovary Tumor	Ovary			pSport I
H0431	H. Kidney Medulla, re-excision	Kidney medulla	Kidney			pBluescript
H0435	Ovarian Tumor 10-3-95	Ovarian Tumor, OV350721	Ovary			pCMVSPORT 2.0
H0436	Resting T-Cell Library, II	T-Cells	Blood	Cell Line		pSport I
H0478	Salivary Gland, Lib 2	Human Salivary Gland	Salivary gland			pSport I
H0483	Breast Cancer cell line, MDA 36	Breast Cancer Cell line, MDA 36				pSport I
H0484	Breast Cancer Cell line, angiogenic	Breast Cancer Cell line, Angiogenic, 36T3				pSport I
H0486	Hodgkin's Lymphoma II	Hodgkin's Lymphoma II			disease	pCMVSPORT 2.0
H0494	Keratinocyte	Keratinocyte				pCMVSPORT 2.0
H0520	NTERA2 + retinoic acid, 14 days	NTERA2, Teratocarcinoma cell line				pSport I
H0521	Primary Dendritic Cells, lib 1	Primary Dendritic cells				pCMVSPORT 3.0
H0533	Human Stromal endometrial fibroblasts, treated w/ estradiol	Human Stromal endometrial fibroblasts, treated wit				pSport I
H0534	Human Stromal endometrial fibroblasts, treated with progesterone	Human Stromal endometrial fibroblasts, treated w/				pSport I
H0539	Pancreas Islet Cell Tumor	Pancreas Islet Cell Tumour	Pancreas		disease	pSport I
H0543	T cell helper II	Helper T cell				pCMVSPORT 3.0
H0544	Human endometrial stromal cells	Human endometrial stromal cells				pCMVSPORT 3.0
H0545	Human endometrial stromal cells-treated with progesterone	Human endometrial stromal cells-treated with proge				pCMVSPORT 3.0
H0546	Human endometrial stromal cells-treated with estradiol	Human endometrial stromal cells-treated with estra				pCMVSPORT 3.0
H0547	NTERA2 teratocarcinoma cell line+retinoic acid (14 days)	NTERA2, Teratocarcinoma cell line				pSport I

H0549	H. Epididymus, caput & corpus	Human Epididymus, caput and corpus				Uni-ZAP XR
H0550	H. Epididymus, cauda	Human Epididymus, cauda				Uni-ZAP XR
H0551	Human Thymus Stromal Cells	Human Thymus Stromal Cells				pCMVSPORT 3.0
H0553	Human Placenta	Human Placenta				pCMVSPORT 3.0
H0555	Rejected Kidney, lib 4	Human Rejected Kidney	Kidney		disease	pCMVSPORT 3.0
H0560	KMH2	KMH2				pCMVSPORT 3.0
H0587	Healing groin wound; 7.5 hours post incision	Groin-2/19/97	groin		disease	pCMVSPORT 3.0
H0592	Healing groin wound - zero hr post-incision (control)	HGS wound healing project; abdomen			disease	pCMVSPORT 3.0
H0593	Olfactory epithelium; nasal cavity	Olfactory epithelium from roof of left nasal cavity				pCMVSPORT 3.0
H0596	Human Colon Cancer; re-excision	Human Colon Cancer	Colon			Lambda ZAP II
H0606	Human Primary Breast Cancer; re-excision	Human Primary Breast Cancer	Breast		disease	Uni-ZAP XR
H0615	Human Ovarian Cancer Reexcision	Ovarian Cancer	Ovary		disease	Uni-ZAP XR
H0616	Human Testes, Reexcision	Human Testes	Testis			Uni-ZAP XR
H0617	Human Primary Breast Cancer Reexcision	Human Primary Breast Cancer	Breast		disease	Uni-ZAP XR
H0618	Human Adult Testes, Large Inserts, Reexcision	Human Adult Testis	Testis			Uni-ZAP XR
H0623	Human Umbilical Vein; Reexcision	Human Umbilical Vein Endothelial Cells	Umbilical vein			Uni-ZAP XR
H0632	Hepatocellular Tumor; re-excision	Hepatocellular Tumor	Liver			Lambda ZAP II
H0634	Human Testes Tumor, re-excision	Human Testes Tumor	Testis		disease	Uni-ZAP XR
H0641	LPS activated derived dendritic cells	LPS activated monocyte derived dendritic cells				pSport1
H0643	Hep G2 Cells, PCR library	Hep G2 Cells				Other
H0644	Human Placenta (re-excision)	Human Placenta	Placenta			Uni-ZAP XR
H0646	Lung, Cancer (4005313 A3): Invasive Poorly Differentiated Lung Adenocarcinoma,	Metastatic squamous cell lung carcinoma, poorly di				pSport1
H0647	Lung, Cancer (4005163 B7): Invasive, Poorly Diff. Adenocarcinoma, Metastatic	Invasive poorly differentiated lung adenocarcinoma			disease	pSport1
H0648	Ovary, Cancer: (4004562 B6) Papillary Serous Cystic Neoplasm, Low Malignant Pot	Papillary Cystic neoplasm of low malignant potential			disease	pSport1
H0650	B-Cells	B-Cells				pCMVSPORT 3.0
H0651	Ovary, Normal: (9805C040R)	Normal Ovary				pSport1
H0657	B-cells (stimulated)	B-cells (stimulated)				pSport1

H0658	Ovary, Cancer (9809C332): Poorly differentiated adenocarcinoma	9809C332- Poorly differentiate	Ovary & Fallopian Tubes		disease	pSport I
H0659	Ovary, Cancer (15395A1F): Grade II Papillary Carcinoma	Grade II Papillary, Carcinoma, Ovary	Ovary		disease	pSport I
H0660	Ovary, Cancer: (15799A1F) Poorly differentiated carcinoma	Poorly differentiated carcinoma, ovary			disease	pSport I
H0661	Breast, Cancer: (4004943 A5)	Breast cancer			disease	pSport I
H0662	Breast, Normal: (4005522B2)	Normal Breast - #4005522(B2)	Breast			pSport I
H0663	Breast, Cancer: (4005522 A2)	Breast Cancer - #4005522(A2)	Breast		disease	pSport I
H0664	Breast, Cancer: (9806C012R)	Breast Cancer	Breast		disease	pSport I
H0666	Ovary, Cancer: (4004332 A2)	Ovarian Cancer, Sample #4004332A2			disease	pSport I
H0670	Ovary, Cancer(4004650 A3): Well-Differentiated Micropapillary Serous Carcinoma	Ovarian Cancer - 4004650A3				pSport I
H0672	Ovary, Cancer: (4004576 A8)	Ovarian Cancer(4004576A8)	Ovary			pSport I
H0673	Human Prostate Cancer, Stage B2; re-excision	Human Prostate Cancer, stage B2	Prostate			Uni-ZAP XR
H0674	Human Prostate Cancer, Stage C; re-excision	Human Prostate Cancer, stage C	Prostate			Uni-ZAP XR
H0676	Colon, Cancer: (9808C064R)-total RNA	Colon Cancer 9808C064R				pCMVSPORT 3.0
H0678	screened clones from placental library	Placenta	Placenta			Other
H0683	Ovarian Serous Papillary Adenocarcinoma	Serous papillary adenocarcinoma, stage 3C (9804G01)				pCMVSPORT 3.0
H0685	Adenocarcinoma of Ovary, Human Cell Line, # OVCAR-3	Adenocarcinoma of Ovary, Human Cell Line, # OVCAR-				pCMVSPORT 3.0
H0686	Adenocarcinoma of Ovary, Human Cell Line	Adenocarcinoma of Ovary, Human Cell Line, # SW-626				pCMVSPORT 3.0
H0687	Human normal ovary(#9610G215)	Human normal ovary(#9610G215)	Ovary			pCMVSPORT 3.0
H0688	Human Ovarian Cancer(#9807G017)	Human Ovarian cancer(#9807G017), mRNA from Maura Ru				pCMVSPORT 3.0
H0689	Ovarian Cancer	Ovarian Cancer, #9806G019				pCMVSPORT 3.0
H0690	Ovarian Cancer, # 9702G001	Ovarian Cancer, #9702G001				pCMVSPORT 3.0
S0004	Prostate	Prostate BPH	Prostate			Lambda ZAP II
S0013	Prostate	Prostate	prostate			Uni-ZAP XR
S0014	Kidney Cortex	Kidney cortex	Kidney			Uni-ZAP XR
S0026	Stromal cell TF274	stromal cell	Bone marrow	Cell Line		Uni-ZAP XR
S0028	Smooth muscle, control	Smooth muscle	Pulmonary artery	Cell Line		Uni-ZAP XR
S0042	Testes	Human Testes				ZAP Express

S0044	Prostate BPH	prostate BPH	Prostate		disease	Uni-ZAP XR
S0052	neutrophils control	human neutrophils	blood	Cell Line		Uni-ZAP XR
S0112	Hypothalamus		Brain			Uni-ZAP XR
S0134	Apoptotic T-cell	apoptotic cells		Cell Line		Uni-ZAP XR
S0146	prostate-edited	prostate BPH	Prostate			Uni-ZAP XR
S0148	Normal Prostate	Prostate	prostate			Uni-ZAP XR
S0150	LNCAP prostate cell line	LNCAP Cell Line	Prostate	Cell Line		Uni-ZAP XR
S0152	PC3 Prostate cell line	PC3 prostate cell line				Uni-ZAP XR
S0168	Prostate/LNCAP, subtraction I	PC3 prostate cell line				pBluescript
S0174	Prostate-BPH subtracted II	Human Prostate BPH				pBluescript
S0176	Prostate, normal, subtraction I	Prostate	prostate			Uni-ZAP XR
S0188	Prostate,BPH, Lib 2	Human Prostate BPH			disease	pSport I
S0190	Prostate BPH,Lib 2, subtracted	Human Prostate BPH				pSport I
S0212	Bone Marrow Stromal Cell, untreated	Bone Marrow Stromal Cell, untreated				pSport I
S0222	H. Frontal cortex,epileptic;re-excision	H. Brain, Frontal Cortex, Epileptic	Brain		disease	Uni-ZAP XR
S0242	Synovial Fibroblasts (III/TNF), subt	Synovial Fibroblasts				pSport I
S0274	PCMIX	PCMIX (Human Cerebellum)	Brain			PCR II
S0282	Brain Frontal Cortex, re-excision	Brain frontal cortex	Brain			Lambda ZAP II
S0284	7TMCTT (Testis)	7TMCTP (Placenta)	Testis			PCR II
S0286	7TMCTP (Placenta)	H7MCTP (PLACENTA)	Placenta			PCR II
S0294	Larynx tumor	Larynx tumor	Larynx,vocal cord		disease	pSport I
S0326	Mammary Gland	Mammary Gland	Whole mammary gland			pSport I
S0328	Palate carcinoma	Palate carcinoma	Uvula		disease	pSport I
S0352	Larynx Carcinoma	Larynx carcinoma			disease	pSport I
S0354	Colon Normal II	Colon Normal	Colon			pSport I
S0358	Colon Normal III	Colon Normal	Colon			pSport I
S0360	Colon Tumor II	Colon Tumor	Colon		disease	pSport I
S0374	Normal colon	Normal colon				pSport I
S0380	Pancreas Tumor PCA4 Tu	Pancreas Tumor PCA4 Tu			disease	pSport I
S0396	Uterus; normal	Uterus; normal				pSport I
S0398	Testis; normal	Testis; normal				pSport I
S0412	Temporal cortex-Alzheimer; subtracted	Temporal cortex, alzheimer			disease	Other
S0422	Mo7e Cell Line GM-CSF treated (1ng/ml)	Mo7e Cell Line GM-CSF treated (1ng/ml)				pCMVSPORT 3.0
S0424	TF-1 Cell Line GM-CSF Treated	TF-1 Cell Line GM-CSF Treated				pSport I
S0442	Colon Normal	Colon Normal				pSport I
S0444	Colon Tumor	Colon Tumour			disease	pSport I
S0454	Placenta	Placenta	Placenta			pSport I
S0456	Tongue Normal	Tongue Normal				pSport I
S0460	Thyroid Tumour	Thyroid Tumour				pSport I

T0010	Human Infant Brain	Human Infant Brain				Other
T0041	Jurkat T-cell G1 phase	Jurkat T-cell				pBluescript SK-
T0068	Normal Ovary, Premenopausal	Normal Ovary, Premenopausal				pBluescript SK-
T0069	Human Uterus, normal	Human Uterus, normal				pBluescript SK-
L0005	Clontech human aorta polyA+ mRNA (#6572)					
L0021	Human adult (K.Okubo)					
L0023	human adult testis					
L0040	Human colon mucosa					
L0041	Human epidermal keratinocyte					
L0060	Human thymus NSTH II					
L0070	Selected chromosome 21 cDNA library					
L0109	Human brain cDNA	brain				
L0142	Human placenta cDNA (TFujiwara)	placenta				
L0143	Human placenta polyA+ (TFujiwara)	placenta				
L0151	Human testis (C. De Smet)	testis				
L0157	Human fetal brain (TFujiwara)		brain			
L0163	Human heart cDNA (YNakamura)		heart			
L0351	Infant brain, Bento Soares					BA, M13-derived
L0352	Normalized infant brain, Bento Soares					BA, M13-derived
L0361	Stratagene ovary (#937217)		ovary			Bluescript SK
L0362	Stratagene ovarian cancer (#937219)					Bluescript SK-
L0363	NCI_CGAP_GC2	germ cell tumor				Bluescript SK-
L0365	NCI_CGAP_Phe1	pheochromocytoma				Bluescript SK-
L0366	Stratagene schizo brain S11	schizophrenic brain S-11 frontal lobe				Bluescript SK-
L0367	NCI_CGAP_Sch1	Schwannoma tumor				Bluescript SK-
L0369	NCI_CGAP_AA1	adrenal adenoma	adrenal gland			Bluescript SK-
L0371	NCI_CGAP_Br3	breast tumor	breast			Bluescript SK-
L0372	NCI_CGAP_Co12	colon tumor	colon			Bluescript SK-
L0373	NCI_CGAP_Co11	tumor	colon			Bluescript SK-
L0374	NCI_CGAP_Co2	tumor	colon			Bluescript SK-
L0375	NCI_CGAP_Kid6	kidney tumor	kidney			Bluescript SK-
L0376	NCI_CGAP_Lar1	larynx	larynx			Bluescript SK-
L0378	NCI_CGAP_Lu1	lung tumor	lung			Bluescript SK-
L0380	NCI_CGAP_HN1	squamous cell	lymph node			Bluescript

L0381	NCI_CGAP_HN4	carcinoma squamous cell carcinoma	pharynx			SK- Bluescript SK-
L0383	NCI_CGAP_Pr24	invasive tumor (cell line)	prostate			Bluescript SK-
L0411	1-NIB					Lafmid BA
L0435	Infant brain, LLNL array of Dr. M. Soares 1NIB					lafmid BA
L0438	normalized infant brain cDNA	total brain	brain			lafmid BA
L0439	Soares infant brain 1NIB		whole brain			Lafmid BA
L0441	2HB3MK					Lafmid BK
L0455	Human retina cDNA randomly primed sublibrary	retina	eye			lambda gt10
L0462	WATM1					lambda gt11
L0465	TEST1, Human adult Testis tissue					lambda nm1149
L0470	BL29 Burkitt's lymphoma, Pascalis Sideras					lambda ZAP 2
L0471	Human fetal heart, Lambda ZAP Express					Lambda ZAP Express
L0475	KG1-a Lambda Zap Express cDNA library			KG1-a		Lambda Zap Express (Stratagene)
L0480	Stratagene cat#937212 (1992)					Lambda ZAP, pBluescript SK(-)
L0483	Human pancreatic islet					Lambda ZAPII
L0485	STRATAGENE Human skeletal muscle cDNA library, cat. #936215.	skeletal muscle	leg muscle			Lambda ZAPII
L0492	Human Genomic					pAMP
L0509	NCI_CGAP_Lu26	invasive adenocarcinoma	lung			pAMP1
L0512	NCI_CGAP_Ov36	borderline ovarian carcinoma	ovary			pAMP1
L0513	NCI_CGAP_Ov37	early stage papillary serous carcinoma	ovary			pAMP1
L0515	NCI_CGAP_Ov32	papillary serous carcinoma	ovary			pAMP1
L0516	Chromosome 19p12-p13.1 exon					pAMP10
L0517	NCI CGAP Pr1					pAMP10
L0518	NCI CGAP Pr2					pAMP10
L0519	NCI CGAP Pr3					pAMP10
L0520	NCI_CGAP_Alv1	alveolar rhabdomyosarcoma				pAMP10
L0521	NCI CGAP Ew1	Ewing's sarcoma				pAMP10
L0522	NCI CGAP Kid1	kidney				pAMP10
L0523	NCI CGAP Lip2	liposarcoma				pAMP10
L0524	NCI CGAP Li1	liver				pAMP10
L0526	NCI_CGAP_Pr12	metastatic prostate bone lesion				pAMP10
L0527	NCI CGAP Ov2	ovary				pAMP10
L0528	NCI CGAP Pr5	prostate				pAMP10
L0529	NCI CGAP Pr6	prostate				pAMP10
L0532	NCI_CGAP_Thy1	thyroid				pAMP10

L0533	NCI CGAP HSC1	stem cells	bone marrow		pAMP10
L0534	Chromosome 7 Fetal Brain cDNA Library	brain	brain		pAMP10
L0536	NCI CGAP Br4	normal ductal tissue	breast		pAMP10
L0539	Chromosome 7 Placental cDNA Library		placenta		pAMP10
L0542	NCI CGAP Pr11	normal prostatic epithelial cells	prostate		pAMP10
L0547	NCI CGAP Pr16	tumor	prostate		pAMP10
L0558	NCI CGAP_Ov40	endometrioid ovarian metastasis	ovary		pAMP10
L0565	Normal Human Trabecular Bone Cells	Bone	Hip		pBluescript
L0581	Stratagene liver (#937224)		liver		pBluescript SK
L0586	HTCDL1				pBluescript SK(-)
L0587	Stratagene colon HT29 (#937221)				pBluescript SK-
L0588	Stratagene endothelial cell 937223				pBluescript SK-
L0589	Stratagene fetal retina 937202				pBluescript SK-
L0590	Stratagene fibroblast (#937212)				pBluescript SK-
L0591	Stratagene HeLa cell s3 937216				pBluescript SK-
L0592	Stratagene hNT neuron (#937233)				pBluescript SK-
L0593	Stratagene neuroepithelium (#937231)				pBluescript SK-
L0594	Stratagene neuroepithelium NT2RAMI 937234				pBluescript SK-
L0595	Stratagene NT2 neuronal precursor 937230	neuroepithelial cells	brain		pBluescript SK-
L0596	Stratagene colon (#937204)		colon		pBluescript SK-
L0597	Stratagene corneal stroma (#937222)		cornea		pBluescript SK-
L0598	Morton Fetal Cochlea	cochlea	ear		pBluescript SK-
L0599	Stratagene lung (#937210)		lung		pBluescript SK-
L0600	Weizmann Olfactory Epithelium	olfactory epithelium	nose		pBluescript SK-
L0601	Stratagene pancreas (#937208)		pancreas		pBluescript SK-
L0602	Pancreatic Islet	pancreatic islet	pancreas		pBluescript SK-
L0603	Stratagene placenta (#937225)		placenta		pBluescript SK-
L0604	Stratagene muscle 937209	muscle	skeletal muscle		pBluescript SK-
L0605	Stratagene fetal spleen (#937205)	fetal spleen	spleen		pBluescript SK-
L0606	NCI CGAP_Lym5	follicular lymphoma	lymph node		pBluescript SK-
L0608	Stratagene lung carcinoma 937218	lung carcinoma	lung	NCI-H69	pBluescript SK-

L0612	Schiller oligodendroglioma	oligodendroglioma	brain			pBluescript SK- (Stratagene)
L0617	Chromosome 22 exon					pBluescriptII KS+
L0618	Chromosome 9 exon					pBluescriptII KS+
L0623	HM3	pectoral muscle (after mastectomy)				pcDNAII (Invitrogen)
L0626	NCI_CGAP_GC1	bulk germ cell seminoma				pCMV-SPORT2
L0635	NCI_CGAP_PNS1	dorsal root ganglion	peripheral nervous system			pCMV-SPORT4
L0637	NCI_CGAP_Brn53	three pooled meningiomas	brain			pCMV-SPORT6
L0638	NCI_CGAP_Brn35	tumor, 5 pooled (see description)	brain			pCMV-SPORT6
L0639	NCI_CGAP_Brn52	tumor, 5 pooled (see description)	brain			pCMV-SPORT6
L0642	NCI_CGAP_Co18	moderately differentiated adenocarcinoma	colon			pCMV-SPORT6
L0646	NCI_CGAP_Co14	moderately-differentiated adenocarcinoma	colon			pCMV-SPORT6
L0647	NCI_CGAP_Sar4	five pooled sarcomas, including myxoid liposarcoma	connective tissue			pCMV-SPORT6
L0649	NCI_CGAP_GUI	2 pooled high-grade transitional cell tumors	genitourinary tract			pCMV-SPORT6
L0655	NCI_CGAP_Lym12	lymphoma, follicular mixed small and large cell	lymph node			pCMV-SPORT6
L0656	NCI_CGAP_Ov38	normal epithelium	ovary			pCMV-SPORT6
L0657	NCI_CGAP_Ov23	tumor, 5 pooled (see description)	ovary			pCMV-SPORT6
L0658	NCI_CGAP_Ov35	tumor, 5 pooled (see description)	ovary			pCMV-SPORT6
L0659	NCI_CGAP_Pan1	adenocarcinoma	pancreas			pCMV-SPORT6
L0661	NCI_CGAP_Mel15	malignant melanoma, metastatic to lymph node	skin			pCMV-SPORT6
L0662	NCI_CGAP_Gas4	poorly differentiated adenocarcinoma with signet r	stomach			pCMV-SPORT6
L0663	NCI_CGAP_Ut2	moderately-differentiated endometrial adenocarcinoma	uterus			pCMV-SPORT6
L0664	NCI_CGAP_Ut3	poorly-differentiated endometrial adenocarcinoma,	uterus			pCMV-SPORT6
L0665	NCI_CGAP_Ut4	serous papillary carcinoma, high grade, 2 pooled t	uterus			pCMV-SPORT6
L0666	NCI_CGAP_Ut1	well-differentiated endometrial	uterus			pCMV-SPORT6

		adenocarcinoma, 7				
L0667	NCI_CGAP_CML1	myeloid cells, 18 pooled CML cases, BCR/ABL rcarra	whole blood			pCMV- SPORT6
L0686	Stanley Frontal SN pool 2	frontal lobe (see description)	brain			pCR2.1- TOPO (Invitrogen)
L0697	Testis 1					PGEM 5zf(+)
L0698	Testis 2					PGEM 5zf(+)
L0700	Outward Alu-primed, hncDNA library					pGEM-3Z
L0717	Gessler Wilms tumor					pSPORT1
L0731	Soares_pregnant_uterus_ NbHPU		uterus			pT7T3-Pac
L0738	Human colorectal cancer					pT7T3D
L0740	Soares melanocyte 2NbHM	melanocyte				pT7T3D (Pharmacia) with a modified polylinker
L0741	Soares adult brain N2b4HB55Y		brain			pT7T3D (Pharmacia) with a modified polylinker
L0742	Soares adult brain N2b5HB55Y		brain			pT7T3D (Pharmacia) with a modified polylinker
L0743	Soares breast 2NbHBst		breast			pT7T3D (Pharmacia) with a modified polylinker
L0744	Soares breast 3NbHBst		breast			pT7T3D (Pharmacia) with a modified polylinker
L0745	Soares retina N2b4HR	retina	eye			pT7T3D (Pharmacia) with a modified polylinker
L0746	Soares retina N2b5HR	retina	eye			pT7T3D (Pharmacia) with a modified polylinker
L0747	Soares_fetal_heart_NbHH 19W		heart			pT7T3D (Pharmacia) with a modified polylinker
L0748	Soares fetal liver spleen 1NFLS		Liver and Spleen			pT7T3D (Pharmacia) with a modified polylinker

L0749	Soares_fetal_liver_spleen_INFLS_S1		Liver and Spleen			pT7T3D (Pharmacia) with a modified polylinker
L0750	Soares_fetal_lung_NbHLI 9W		lung			pT7T3D (Pharmacia) with a modified polylinker
L0751	Soares ovary tumor NbHOT	ovarian tumor	ovary			pT7T3D (Pharmacia) with a modified polylinker
L0752	Soares_parathyroid_tumor_NbHPA	parathyroid tumor	parathyroid gland			pT7T3D (Pharmacia) with a modified polylinker
L0753	Soares_pineal_gland_N3H PG		pineal gland			pT7T3D (Pharmacia) with a modified polylinker
L0754	Soares placenta Nb2HP		placenta			pT7T3D (Pharmacia) with a modified polylinker
L0755	Soares_placenta_8to9weeks_2NbHP8to9W		placenta			pT7T3D (Pharmacia) with a modified polylinker
L0756	Soares_multiple_sclerosis_2NbHMSP	multiple sclerosis lesions				pT7T3D (Pharmacia) with a modified polylinker V TYPE
L0757	Soares_senescent_fibroblasts_NbHSF	senescent fibroblast				pT7T3D (Pharmacia) with a modified polylinker V TYPE
L0758	Soares_testis_NHT					pT7T3D-Pac (Pharmacia) with a modified polylinker
L0759	Soares_total_fetus_Nb2HF8_9w					pT7T3D-Pac (Pharmacia) with a modified polylinker
L0761	NCI_CGAP_CLL1	B-cell, chronic lymphocytic leukemia				pT7T3D-Pac (Pharmacia) with a modified polylinker
L0762	NCI_CGAP_Br1.1	breast				pT7T3D-Pac

						(Pharmacia) with a modified polylinker
L0763	NCI_CGAP_Br2	breast				pT7T3D-Pac (Pharmacia) with a modified polylinker
L0764	NCI_CGAP_Co3	colon				pT7T3D-Pac (Pharmacia) with a modified polylinker
L0765	NCI_CGAP_Co4	colon				pT7T3D-Pac (Pharmacia) with a modified polylinker
L0766	NCI_CGAP_GCB1	germinal center B cell				pT7T3D-Pac (Pharmacia) with a modified polylinker
L0767	NCI_CGAP_GC3	pooled germ cell tumors				pT7T3D-Pac (Pharmacia) with a modified polylinker
L0768	NCI_CGAP_GC4	pooled germ cell tumors				pT7T3D-Pac (Pharmacia) with a modified polylinker
L0769	NCI_CGAP_Bm25	anaplastic oligodendroglioma	brain			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0770	NCI_CGAP_Bm23	glioblastoma (pooled)	brain			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0771	NCI_CGAP_Co8	adenocarcinoma	colon			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0772	NCI_CGAP_Co10	colon tumor RER+	colon			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0773	NCI_CGAP_Co9	colon tumor RER+	colon			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0774	NCI_CGAP_Kid3		kidney			pT7T3D-Pac (Pharmacia) with a modified

						polylinker
L0775	NCI_CGAP_Kid5	2 pooled tumors (clear cell type)	kidney			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0776	NCI_CGAP_Lu5	carcinoid	lung			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0777	Soares_NhHMPu_S1	Pooled human melanocyte, fetal heart, and pregnant	mixed (see below)			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0779	Soares_NFL_T_GBC_S1		pooled			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0780	Soares_NSF_F8_9W_OT _PA_P_S1		pooled			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0782	NCI_CGAP_Pr21	normal prostate	prostate			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0783	NCI_CGAP_Pr22	normal prostate	prostate			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0786	Soares_NbHFB		whole brain			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0787	NCI_CGAP_Sub1					pT7T3D-Pac (Pharmacia) with a modified polylinker
L0788	NCI_CGAP_Sub2					pT7T3D-Pac (Pharmacia) with a modified polylinker
L0789	NCI_CGAP_Sub3					pT7T3D-Pac (Pharmacia) with a modified polylinker
L0790	NCI_CGAP_Sub4					pT7T3D-Pac (Pharmacia) with a modified polylinker
L0791	NCI_CGAP_Sub5					pT7T3D-Pac (Pharmacia)

						with a modified polylinker
L0792	NCI_CGAP_Sub6					pT7T3D-Pac (Pharmacia) with a modified polylinker
L0794	NCI_CGAP_GC6	pooled germ cell tumors				pT7T3D-Pac (Pharmacia) with a modified polylinker
L0796	NCI_CGAP_Brn50	medulloblastoma	brain			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0800	NCI_CGAP_Co16	colon tumor, RER+	colon			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0803	NCI_CGAP_Kid11		kidney			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0804	NCI_CGAP_Kid12	2 pooled tumors (clear cell type)	kidney			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0805	NCI_CGAP_Lu24	carcinoid	lung			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0806	NCI_CGAP_Lu19	squamous cell carcinoma, poorly differentiated (4	lung			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0807	NCI_CGAP_Ov18	fibrotheoma	ovary			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0809	NCI_CGAP_Pr28		prostate			pT7T3D-Pac (Pharmacia) with a modified polylinker

TABLE 5

OMIM Reference	Description
102200	Somatotrophinoma
102480	Male infertility due to acrosin deficiency
102770	Myoadenylate deaminase deficiency
103050	Autism, succinylpurinemic
103050	Adenylosuccinase deficiency
104770	Amyloidosis, secondary, susceptibility to
106100	Angioedema, hereditary
106150	Hypertension, essential, susceptibility to
106150	Preeclampsia, susceptibility to
106300	Ankylosing spondylitis
107670	Apolipoprotein A-II deficiency
107741	Hyperlipoproteinemia, type III
107910	Virilization, maternal and fetal, from placental aromatase deficiency
107910	Gynecomastia, familial, due to increased aromatase activity
108725	Atherosclerosis, susceptibility to
108800	Atrial septal defect, secundum type
108962	Hypertension, salt-resistant
109270	Renal tubular acidosis, distal, 179800
109270	Spherocytosis, hereditary
109270	[Acanthocytosis, one form]
109270	[Elliptocytosis, Malaysian-Melanesian type]
109270	Hemolytic anemia due to band 3 defect
109400	Basal cell nevus syndrome
109700	Hemodialysis-related amyloidosis
110700	Vivax malaria, susceptibility to
113100	Brachydactyly, type C
113705	Ovarian cancer
113705	Breast cancer-1
113721	Breast cancer
113900	Heart block, progressive familial, type I
114240	Muscular dystrophy, limb-girdle, type 2A, 253600
116806	Colorectal cancer
118485	Polycystic ovary syndrome with hyperandrogenemia
118504	Epilepsy, benign neonatal, type 1, 121200
118504	Epilepsy, nocturnal frontal lobe, 600513
118800	Choreoathetosis, familial paroxysmal
120110	Metaphyseal chondrodysplasia, Schmid type
120120	Epidermolysis bullosa dystrophica, dominant, 131750
120120	Epidermolysis bullosa dystrophica, recessive, 226600
120120	Epidermolysis bullosa, pretibial, 131850
120215	Ehlers-Danlos syndrome, type I, 130000

120215	Ehlers-Danlos syndrome, type II, 130010
120280	Stickler syndrome, type III
120280	Marshall syndrome, 154780
120290	OSMED syndrome, 215150
120290	Stickler syndrome, type II, 184840
120435	Muir-Torre syndrome, 158320
120435	Colorectal cancer, hereditary, nonpolyposis, type 1 Ovarian cancer
120436	Muir-Torre family cancer syndrome, 158320
120436	Turcot syndrome with glioblastoma, 276300
120436	Colorectal cancer, hereditary nonpolyposis, type 2
120700	C3 deficiency
120810	C4 deficiency
120820	C4 deficiency
120940	C9 deficiency
121011	Deafness, autosomal dominant 3, 601544
121011	Deafness, autosomal recessive 1, 220290
121014	Heterotaxia, viscerotaxial, autosomal recessive
122720	Nicotine addiction, protection from
122720	Coumarin resistance, 122700
123620	Cataract, cerulean, type 2, 601547
123660	Cataract, Coppock-like
124030	Parkinsonism, susceptibility to
124030	Debrisoquine sensitivity
124200	Darier disease (keratosis follicularis)
125270	Porphyria, acute hepatic
125270	Lead poisoning, susceptibility to
125660	Myopathy, desminopathic
125660	Cardiomyopathy
125852	Insulin-dependent diabetes mellitus-2
126340	Xeroderma pigmentosum, group D, 278730
126391	DNA ligase I deficiency
126452	Autonomic nervous system dysfunction
126452	[Novelty seeking personality]
126600	Drusen, radial, autosomal dominant
126650	Chloride diarrhea, congenital, Finnish type, 214700
126650	Colon cancer
128100	Dystonia-1, torsion
129500	Ectodermal dysplasia, hidrotic
130410	Glutaricaciduria, type IIB
131100	Multiple endocrine neoplasia I
131100	Prolactinoma, hyperparathyroidism, carcinoid syndrome
131100	Carcinoid tumor of lung
131242	Shah-Waardenburg syndrome, 277580
132800	Basal cell carcinoma
132800	Epithelioma, self-healing, squamous 1, Ferguson-Smith type

133171	[Erythrocytosis, familial], 133100
133450	Neuroepithelioma
133450	Ewing sarcoma
133701	Exostoses, multiple, type 2
133780	Vitreoretinopathy, exudative, familial
134580	Factor XIII B deficiency
134790	Hyperferritinemia-cataract syndrome, 600886
134797	Shprintzen-Goldberg syndrome, 182212
134797	Ectopia lentis, isolated
134797	Marfan syndrome, 154700
135300	Fibromatosis, gingival
135940	Ichthyosis vulgaris, 146700
136350	Pfeiffer syndrome, 101600
136435	Ovarian dysgenesis, hypergonadotropic, with normal karyotype, 233300
136550	Macular dystrophy, North Carolina type
136836	Fucosyltransferase-6 deficiency
137350	Amyloidosis, Finnish type, 105120
138079	Hyperinsulinism, familial, 602485
138079	MODY, type 2, 125851
138320	Hemolytic anemia due to glutathione peroxidase deficiency
138570	Non-insulin dependent diabetes mellitus, susceptibility to
138720	Bernard-Soulier syndrome, type B
138981	Pulmonary alveolar proteinosis, 265120
139191	Growth hormone deficient dwarfism
139320	Pituitary ACTH secreting adenoma
139320	Pseudohypoparathyroidism, type Ia, 103580
139320	Somatotrophinoma
139320	McCune-Albright polyostotic fibrous dysplasia, 174800
141750	Alpha-thalassemia/mental retardation syndrome, type 1
141800	Methemoglobinemias, alpha-
141800	Thalassemias, alpha-
141800	Erythremias, alpha-
141800	Heinz body anemias, alpha-
141850	Thalassemia, alpha-
141850	Erythrocytosis
141850	Heinz body anemia
141850	Hemoglobin H disease
141850	Hypochromic microcytic anemia
141900	Methemoglobinemias, beta-
141900	Sickle cell anemia
141900	Thalassemias, beta-
141900	Erythremias, beta-
141900	HPFH, deletion type
141900	Heinz body anemias, beta-

142000	Thalassemia due to Hb Lepore
142000	Thalassemia, delta-
142200	HPFH, nondeletion type A
142250	HPFH, nondeletion type G
142270	Hereditary persistence of fetal hemoglobin
142470	[Hereditary persistence of fetal hemoglobin, heterocellular]
142857	Pemphigoid, susceptibility to
142858	Beryllium disease, chronic, susceptibility to
142959	Hand-foot-uterus syndrome, 140000
143890	Hypercholesterolemia, familial
144200	Epidermolytic palmoplantar keratoderma
145001	Hyperparathyroidism-jaw tumor syndrome
145260	Pseudohypoaldosteronism, type II
145410	Opitz G syndrome, type II
145981	Hypocalciuric hypercalcemia, type II
146760	[IgG receptor I, phagocytic, familial deficiency of]
146790	Lupus nephritis, susceptibility to
147050	Atopy
147141	Leukemia, acute lymphoblastic
147200	[Kappa light chain deficiency]
147440	Growth retardation with deafness and mental retardation
147670	Rabson-Mendenhall syndrome
147670	Diabetes mellitus, insulin-resistant, with acanthosis nigricans
147670	Leprechaunism
148065	White sponge nevus, 193900
148066	Epidermolysis bullosa simplex, Koebner, Dowling-Meara, and Weber-Cockayne types, 131900, 131760, 131800
148066	Epidermolysis bullosa simplex, recessive, 601001
148067	Nonepidermolytic palmoplantar keratoderma, 600962
148067	Pachyonychia congenita, Jadassohn-Lewandowsky type, 167200
148069	Pachyonychia congenita, Jackson-Lawler type, 167210
148080	Epidermolytic hyperkeratosis, 113800
150270	Laryngeal adductor paralysis
151400	Leukemia/lymphoma, B-cell, 1
151440	Leukemia, T-cell acute lymphoblastoid
151670	Hepatic lipase deficiency
152200	Coronary artery disease, susceptibility to
152445	Vohwinkel syndrome, 124500
152445	Erythrokeratoderma, progressive symmetric, 602036
152760	Hypogonadotropic hypogonadism due to GNRH deficiency, 227200
152790	Precocious puberty, male, 176410
152790	Leydig cell hypoplasia
153700	Macular dystrophy, vitelliform type
153880	Macular dystrophy, dominant cystoid

154275	Malignant hyperthermia susceptibility 2
154276	Malignant hyperthermia susceptibility 3
155555	[Red hair/fair skin]
155555	UV-induced skin damage, vulnerability to
156225	Muscular dystrophy, congenital merosin-deficient
156850	Cataract, congenital, with microphthalmia
157170	Holoprosencephaly-2
158590	Spinal muscular atrophy-4
159001	Muscular dystrophy, limb-girdle, type 1B
160781	Cardiomyopathy, hypertrophic, mid-left ventricular chamber type
160900	Myotonic dystrophy
161015	Mitochondrial complex I deficiency, 252010
163950	Noonan syndrome-1
163950	Cardiofaciocutaneous syndrome, 115150
164009	Leukemia, acute promyelocytic, NUMA/RARA type
164200	Oculodentodigital dysplasia
164200	Syndactyly, type III, 186100
164731	Ovarian carcinoma, 167000
164953	Liposarcoma
166600	Osteopetrosis, AD, type II
167000	Ovarian cancer, serous
167250	Paget disease of bone
168461	Multiple myeloma, 254250
168461	Parathyroid adenomatosis 1
168461	Centrocytic lymphoma
168468	Metaphyseal chondrodysplasia, Murk Jansen type, 156400
168500	Parietal foramina
168610	Parkinsonism-dementia with pallidopontonigral degeneration
170261	Bare lymphocyte syndrome, type I, due to TAP2 deficiency
170995	Zellweger syndrome-2
171190	Hypertension, essential, 145500
171650	Lysosomal acid phosphatase deficiency
172400	Hemolytic anemia due to glucosephosphate isomerase deficiency
172400	Hydrops fetalis, one form
173360	Thrombophilia due to excessive plasminogen activator inhibitor
173360	Hemorrhagic diathesis due to PAI1 deficiency
173370	Plasminogen activator deficiency
173850	Polio, susceptibility to
173870	Xeroderma pigmentosum
173870	Fanconi anemia
174000	Medullary cystic kidney disease, AD
176705	Breast cancer, sporadic
176730	Diabetes mellitus, rare form
176730	Hyperproinsulinemia, familial
176730	MODY, one form

176930	Dysprothrombinemia
176930	Hypoprothrombinemia
177900	Psoriasis susceptibility-1
178640	Pulmonary alveolar proteinosis, congenital, 265120
179450	Ragweed sensitivity
179605	Retinitis pigmentosa, digenic
179605	Retinitis pigmentosa-7, peripherin-related
179605	Retinitis punctata albescens
179605	Butterfly dystrophy, retinal
179605	Macular dystrophy
179755	Renal cell carcinoma, papillary, 1
180020	Retinal cone dystrophy-1
180100	Retinitis pigmentosa-1
180104	Retinitis pigmentosa-9
180297	Anemia, hemolytic, Rh-null, suppressor type, 268150
180721	Retinitis pigmentosa, digenic
180840	Susceptibility to IDDM
180901	Malignant hyperthermia susceptibility 1, 145600
180901	Central core disease, 117000
181430	Scapuloperoneal syndrome, myopathic type
182280	Small-cell cancer of lung
182380	Glucose/galactose malabsorption
182601	Spastic paraplegia-4
182860	Pyropoikilocytosis
182860	Spherocytosis, recessive
182860	Elliptocytosis-2
182900	Spherocytosis-2
185430	Atherosclerosis, susceptibility to
185800	Symphalangism, proximal
186580	Arthrocutaneous granulomatosis
186855	Leukemia-2, T-cell acute lymphoblastic
188070	Bleeding disorder due to defective thromboxane A2 receptor
188540	Hypothyroidism, nongoitrous
188826	Sorsby fundus dystrophy, 136900
189800	Preeclampsia/eclampsia
190020	Bladder cancer, 109800
190040	Dermatofibrosarcoma protuberans
190040	Giant-cell fibroblastoma
190040	Meningioma, SIS-related
190182	Colon cancer
190182	Colorectal cancer, familial nonpolyposis, type 6
190198	Leukemia, T-cell acute lymphoblastic
191092	Tuberous sclerosis-2
191100	Tuberous sclerosis-1
191170	Colorectal cancer, 114500

191170	Li-Fraumeni syndrome
191181	Cervical carcinoma
191290	Segawa syndrome, recessive
191315	Insensitivity to pain, congenital, with anhidrosis, 256800
192500	Jervell and Lange-Nielsen syndrome, 220400
192500	Long QT syndrome-1
193235	Vitreoretinopathy, neovascular inflammatory
193500	Rhabdomyosarcoma, alveolar, 268220
193500	Waardenburg syndrome, type I
193500	Waardenburg syndrome, type III, 148820
193500	Craniofacial-deafness-hand syndrome, 122880
194071	Wilms tumor, type 2
194071	Adrenocortical carcinoma, hereditary, 202300
200350	Acetyl-CoA carboxylase deficiency
201460	Acyl-CoA dehydrogenase, long chain, deficiency of
201910	Adrenal hyperplasia, congenital, due to 21-hydroxylase deficiency
204500	Ceroid-lipofuscinosis, neuronal 2, classic late infantile
205100	Amyotrophic lateral sclerosis, juvenile
207750	Hyperlipoproteinemia, type Ib
209901	Bardet-Biedl syndrome 1
215700	Citrullinemia
216900	Achromatopsia
217000	C2 deficiency
217050	C6 deficiency
217050	Combined C6/C7 deficiency
217070	C7 deficiency
221770	Polycystic lipomembranous osteodysplasia with sclerosing leukencephalopathy
221820	Gliosis, familial progressive subcortical
222100	Diabetes mellitus, insulin-dependent-1
223360	Dopamine-beta-hydroxylase deficiency
223900	Dysautonomia, familial
227646	Fanconi anemia, type D
227650	Fanconi anemia, type A
230400	Galactosemia
230450	Hemolytic anemia due to gamma-glutamylcysteine synthetase deficiency
230800	Gaucher disease
230800	Gaucher disease with cardiovascular calcification
231670	Glutaricaciduria, type I
231680	Glutaricaciduria, type IIA
231950	Glutathioninuria
232200	Glycogen storage disease I
232400	Glycogen storage disease IIIa
232400	Glycogen storage disease IIIb

232600	McArdle disease
232800	Glycogen storage disease VII
233100	[Renal glucosuria]
235200	Hemochromatosis
237300	Carbamoylphosphate synthetase I deficiency
239500	Hyperprolinemia, type I
245050	Ketoacidosis due to SCOT deficiency
247200	Miller-Dieker lissencephaly syndrome
248600	Maple syrup urine disease, type Ia
248611	Maple syrup urine disease, type Ib
249000	Meckel syndrome
250250	Cartilage-hair hypoplasia
251170	Mevalonicaciduria
252920	Sanfilippo syndrome, type B
253000	Mucopolysaccharidosis IVA
253250	Mulibrey nanism
253700	Muscular dystrophy, limb-girdle, type 2C
253800	Walker-Warburg syndrome, 236670
253800	Fukuyama type congenital muscular dystrophy
256540	Galactosialidosis
256550	Sialidosis, type I
256550	Sialidosis, type II
256850	Giant axonal neuropathy-1
258501	3-methylglutaconicaciduria, type III
259700	Osteopetrosis, recessive
259770	Osteoporosis-pseudoglioma syndrome
261510	Pseudo-Zellweger syndrome
262000	Bjornstad syndrome
263200	Polycystic kidney disease, autosomal recessive
266200	Anemia, hemolytic, due to PK deficiency
268900	[Sarcosinemia]
270800	Spastic paraplegia-5A
272800	Tay-Sachs disease
272800	[Hex A pseudodeficiency]
272800	GM2-gangliosidosis, juvenile, adult
275350	Transcobalamin II deficiency
276700	Tyrosinemia, type I
276710	Tyrosinemia, type III
277700	Werner syndrome
278300	Xanthinuria, type I
278700	Xeroderma pigmentosum, group A
300000	Opitz G syndrome, type I
300066	Deafness, X-linked 6, sensorineural
300067	Subcortical laminar heterotopia, X-linked dominant
300067	Lissencephaly, X-linked

300077	Mental retardation, X-linked 29
300121	Subcortical laminar heteropia, X-linked, 300067
300121	Lissencephaly, X-linked, 300067
300123	Mental retardation with isolated growth hormone deficiency
300310	Agammaglobulinemia, type 2, X-linked
300500	Ocular albinism, Nettleship-Falls type
300650	Ocular albinism with sensorineural deafness
301200	Amelogenesis imperfecta
301201	Amelogenesis imperfecta-3, hypoplastic type
301220	Partington syndrome II
301835	Arts syndrome
301845	Bazex syndrome
301900	Borjeson-Forssman-Lehmann syndrome
302350	Nance-Horan syndrome
302950	Chondrodysplasia punctata, X-linked recessive, 302940
304050	Aicardi syndrome
304110	Craniofrontonasal dysplasia
304340	Mental retardation, X-linked, syndromic-5, with Dandy-Walker malformation, basal ganglia disease, and seizures
306100	Gonadal dysgenesis, XY female type
307150	Hypertrichosis, congenital generalized
307700	Hypoparathyroidism, X-linked
308000	HPRT-related gout
308000	Lesch-Nyhan syndrome
308700	Kallmann syndrome
309000	Lowe syndrome
309530	Mental retardation, X-linked 1, non-dysmorphic
309585	Mental retardation, X-linked, syndromic-6, with gynecomastia and obesity
310490	Cowchock syndrome
311200	Oral-facial-digital syndrome 1
311850	Phosphoribosyl pyrophosphate synthetase-related gout
312040	N syndrome, 310465
313850	Thoracoabdominal syndrome
600040	Colorectal cancer
600045	Xeroderma pigmentosum, group E, subtype 2
600059	Retinitis pigmentosa-13
600105	Retinitis pigmentosa-12, autosomal recessive
600119	Muscular dystrophy, Duchenne-like, type 2
600119	Adhalinopathy, primary
600140	Rubenstein-Taybi syndrome, 180849
600163	Long QT syndrome-3
600175	Spinal muscular atrophy, congenital nonprogressive, of lower limbs
600202	Dyslexia, specific, 2
600234	HMG-CoA synthase-2 deficiency

600261	Ehlers-Danlos-like syndrome
600266	Resistance/susceptibility to TB, etc.
600273	Polycystic kidney disease, infantile severe, with tuberous sclerosis
600276	Cerebral arteriopathy with subcortical infarcts and leukoencephalopathy, 125310
600281	Non-insulin-dependent diabetes mellitus, 125853
600281	MODY, type 1, 125850
600309	Atrioventricular canal defect-1
600319	Diabetes mellitus, insulin-dependent, 4
600320	Insulin-dependent diabetes mellitus-5
600364	Cone dystrophy-3, 602093
600374	Bardet-Biedl syndrome 4
600528	CPT deficiency, hepatic, type I, 255120
600617	Lipoid adrenal hyperplasia, 201710
600623	Prostate cancer, 176807
600759	Alzheimer disease-4
600808	Enuresis, nocturnal, 2
600811	Xeroderma pigmentosum, group E, DDB-negative subtype, 278740
600837	Hirschsprung disease, 142623
600839	Bartter syndrome, 241200
600850	Schizophrenia disorder-4
600856	Beckwith-Wiedemann syndrome, 130650
600883	Diabetes mellitus, insulin-dependent, 8
600897	Cataract, zonular pulverulent-1, 116200
600918	Cystinuria, type III
600946	Short stature, autosomal dominant, with normal serum growth hormone binding protein
600946	Short stature, idiopathic
600946	Laron dwarfism, 262500
600957	Persistent Mullerian duct syndrome, type I, 261550
600958	Cardiomyopathy, familial hypertrophic, 4, 115197
600964	Refsum disease, adult, with increased pipecolicacidemia
600983	Pseudohypoaldosteronism type I, autosomal dominant, 177735
600994	Deafness, autosomal dominant 5
600996	Arrhythmogenic right ventricular dysplasia-2
601071	Deafness, autosomal recessive 9
601105	Pycnodysostosis, 265800
601154	Cardiomyopathy, dilated, 1E
601238	Cerebellar ataxia, Cayman type
601277	Ichthyosis, lamellar, type 2
601284	Hereditary hemorrhagic telangiectasia-2, 600376
601313	Polycystic kidney disease, adult type I, 173900
601316	Deafness, autosomal dominant 10
601362	DiGeorge syndrome/velocardiofacial syndrome complex-2
601363	Wilms tumor, type 4

601410	Diabetes mellitus, transient neonatal
601412	Deafness, autosomal dominant 7
601414	Retinitis pigmentosa-18
601498	Peroxisomal biogenesis disorder, complementation group 4
601517	Spinocerebellar ataxia-2, 183090
601545	Lissencephaly-1
601649	Blepharophimosis, epicanthus inversus, and ptosis, type 2
601652	Glaucoma 1A, primary open angle, juvenile-onset, 137750
601666	Insulin-dependent diabetes mellitus-15
601669	Hirschsprung disease, one form
601680	Distal arthrogryposis, type 2B
601690	Platelet-activating factor acetylhydrolase deficiency
601691	Retinitis pigmentosa-19, 601718
601691	Stargardt disease-1, 248200
601691	Cone-rod dystrophy 3
601691	Fundus flavimaculatus with macular dystrophy, 248200
601718	Retinitis pigmentosa-19
601744	Systemic lupus erythematosus, susceptibility to, 1
601757	Rhizomelic chondrodysplasia punctata, type 1, 215100
601769	Osteoporosis, involutional
601769	Rickets, vitamin D-resistant, 277440
601771	Glaucoma 3A, primary infantile, 231300
601780	Ceroid-lipofuscinosis, neuronal-6, variant late infantile
601785	Carbohydrate-deficient glycoprotein syndrome, type I, 212065
601843	Hypothyroidism, congenital, 274400
601844	Pseudohypoaldosteronism type II
601846	Muscular dystrophy with rimmed vacuoles
601850	Retinitis pigmentosa-deafness syndrome
601863	Bare lymphocyte syndrome, complementation group C
601868	Deafness, autosomal dominant 13
601884	[High bone mass]
601885	Cataract, zonular pulverulent-2
601975	Ectodermal dysplasia/skin fragility syndrome
602025	Obesity/hyperinsulinism, susceptibility to
602026	Refsum disease, 266500
602078	Fibrosis of extraocular muscles, congenital, 2
602088	Nephronophthisis, infantile
602094	Lipodystrophy, familial partial
602099	Amyotrophic lateral sclerosis-5
602116	Glioma
602134	Tremor, familial essential, 2
602136	Refsum disease, infantile, 266510
602136	Zellweger syndrome-1, 214100
602136	Adrenoleukodystrophy, neonatal, 202370
602216	Peutz-Jeghers syndrome, 175200

602221	Stem-cell leukemia/lymphoma syndrome
602225	Cone-rod retinal dystrophy-2, 120970
602225	Leber congenital amaurosis, type III
602229	Waardenburg-Shah syndrome, 277580
602235	Epilepsy, benign, neonatal, type 1, 121200
602280	Retinitis pigmentosa-14, 600132
602447	Coronary artery disease, susceptibility to
602475	Ossification of posterior longitudinal ligament of spine
602477	Febrile convulsions, familial, 2
602491	Hyperlipidemia, familial combined, 1
602544	Parkinson disease, juvenile, type 2, 600116
602631	Rhabdomyosarcoma, 268210
602631	Breast Cancer
602716	Nephrosis-1, congenital, Finnish type, 256300
602772	Retinitis pigmentosa-24
602782	Faisalabad histiocytosis
602783	Spastic paraplegia-7

Polynucleotide and Polypeptide Variants

[0113] The present invention is also directed to variants of the reproductive system associated polynucleotide sequence disclosed in SEQ ID NO:X or the complementary strand thereto, nucleotide sequences encoding the polypeptide of SEQ ID NO:Y, the nucleotide sequence of SEQ ID NO:X encoding the polypeptide sequence as defined in column 6 of Table 1A, nucleotide sequences encoding the polypeptide as defined in column 6 of Table 1A, the nucleotide sequence as defined in columns 8 and 9 of Table 2, nucleotide sequences encoding the polypeptide encoded by the nucleotide sequence as defined in columns 8 and 9 of Table 2, the nucleotide sequence as defined in column 6 of Table 1B, nucleotide sequences encoding the polypeptide encoded by the nucleotide sequence as defined in column 6 of Table 1B, the cDNA sequence contained in Clone ID NO:Z, and/or nucleotide sequences encoding a polypeptide encoded by the cDNA sequence contained in Clone ID NO:Z.

[0114] The present invention also encompasses variants of the polypeptide sequence disclosed in SEQ ID NO:Y, a polypeptide sequence as defined in column 6 of Table 1A, a polypeptide sequence encoded by the polynucleotide sequence in SEQ

ID NO:X, a polypeptide sequence encoded by the nucleotide sequence as defined in columns 8 and 9 of Table 2, a polypeptide sequence encoded by the nucleotide sequence as defined in column 6 of Table 1B, a polypeptide sequence encoded by the complement of the polynucleotide sequence in SEQ ID NO:X, and/or a polypeptide sequence encoded by the cDNA sequence contained in Clone ID NO:Z.

[0115] "Variant" refers to a polynucleotide or polypeptide differing from the polynucleotide or polypeptide of the present invention, but retaining essential properties thereof. Generally, variants are overall closely similar, and, in many regions, identical to the polynucleotide or polypeptide of the present invention.

[0116] Thus, one aspect of the invention provides an isolated nucleic acid molecule comprising, or alternatively consisting of, a polynucleotide having a nucleotide sequence selected from the group consisting of: (a) a nucleotide sequence described in SEQ ID NO:X or contained in the cDNA sequence of Clone ID NO:Z; (b) a nucleotide sequence in SEQ ID NO:X or the cDNA in Clone ID NO:Z which encodes a mature reproductive system associated polypeptide; (c) a nucleotide sequence in SEQ ID NO:X or the cDNA sequence of Clone ID NO:Z, which encodes a biologically active fragment of a reproductive system associated polypeptide; (d) a nucleotide sequence in SEQ ID NO:X or the cDNA sequence of Clone ID NO:Z, which encodes an antigenic fragment of a reproductive system associated polypeptide; (e) a nucleotide sequence encoding a reproductive system associated polypeptide having the complete amino acid sequence of SEQ ID NO:Y or the complete amino acid sequence encoded by the cDNA in Clone ID NO:Z; (f) a nucleotide sequence encoding a mature reproductive system associated polypeptide of the amino acid sequence of SEQ ID NO:Y or the amino acid sequence encoded by the cDNA in Clone ID NO:Z; (g) a nucleotide sequence encoding a biologically active fragment of a reproductive system associated polypeptide having the complete amino acid sequence of SEQ ID NO:Y or the complete amino acid sequence encoded by the cDNA in Clone ID NO:Z; (h) a nucleotide sequence encoding an antigenic fragment of a reproductive system associated polypeptide having the complete amino acid sequence of SEQ ID NO:Y or the complete amino acid sequence encoded by the cDNA in Clone ID NO:Z; and (i) a nucleotide sequence complementary to any of the nucleotide sequences in (a), (b), (c), (d), (e), (f), (g), or (h), above.

[0117] The present invention is also directed to nucleic acid molecules which comprise, or alternatively consist of, a nucleotide sequence which is at least 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99% or 100%, identical to, for example, any of the nucleotide sequences in (a), (b), (c), (d), (e), (f), (g), (h), or (i) above, the nucleotide coding sequence in SEQ ID NO:X or the complementary strand thereto, the nucleotide coding sequence of the cDNA contained in Clone ID NO:Z or the complementary strand thereto, a nucleotide sequence encoding the polypeptide of SEQ ID NO:Y, a nucleotide sequence encoding a polypeptide sequence encoded by the nucleotide sequence in SEQ ID NO:X, a polypeptide sequence encoded by the complement of the polynucleotide sequence in SEQ ID NO:X, a nucleotide sequence encoding the polypeptide encoded by the cDNA contained in Clone ID NO:Z, the nucleotide coding sequence in SEQ ID NO:X as defined in columns 8 and 9 of Table 2 or the complementary strand thereto, a nucleotide sequence encoding the polypeptide encoded by the nucleotide sequence in SEQ ID NO:X as defined in columns 8 and 9 of Table 2 or the complementary strand thereto, the nucleotide coding sequence in SEQ ID NO:B as defined in column 6 of Table 1B or the complementary strand thereto, a nucleotide sequence encoding the polypeptide encoded by the nucleotide sequence in SEQ ID NO:B as defined in column 6 of Table 1B or the complementary strand thereto, the nucleotide sequence in SEQ ID NO:X encoding the polypeptide sequence as defined in column 6 of Table 1A or the complementary strand thereto, nucleotide sequences encoding a polypeptide as defined in column 6 of Table 1A or the complementary strand thereto, and/or polynucleotide fragments of any of these nucleic acid molecules (e.g., those fragments described herein). Polynucleotides which hybridize to the complement of these nucleic acid molecules under stringent hybridization conditions or alternatively, under lower stringency conditions, are also encompassed by the invention, as are polypeptides encoded by these polynucleotides and nucleic acids.

[0118] In a preferred embodiment, the invention encompasses nucleic acid molecules which comprise, or alternatively, consist of a polynucleotide which hybridizes under stringent hybridization conditions, or alternatively, under lower stringency conditions, to a polynucleotide in (a), (b), (c), (d), (e), (f), (g), (h), or (i) above, as are polypeptides encoded by these polynucleotides. In another preferred

embodiment, polynucleotides which hybridize to the complement of these nucleic acid molecules under stringent hybridization conditions or alternatively, under lower stringency conditions, are also encompassed by the invention, as are polypeptides encoded by these polynucleotides.

[0119] In another embodiment, the invention provides a purified protein comprising, or alternatively consisting of, a polypeptide having an amino acid sequence selected from the group consisting of: (a) the complete amino acid sequence of SEQ ID NO:Y or the complete amino acid sequence encoded by the cDNA in Clone ID NO:Z; (b) the amino acid sequence of a mature reproductive system associated polypeptide having the amino acid sequence of SEQ ID NO:Y or the amino acid sequence encoded by the cDNA in Clone ID NO:Z; (c) the amino acid sequence of a biologically active fragment of a reproductive system associated polypeptide having the complete amino acid sequence of SEQ ID NO:Y or the complete amino acid sequence encoded by the cDNA in Clone ID NO:Z; and (d) the amino acid sequence of an antigenic fragment of a reproductive system associated polypeptide having the complete amino acid sequence of SEQ ID NO:Y or the complete amino acid sequence encoded by the cDNA in Clone ID NO:Z.

[0120] The present invention is also directed to proteins which comprise, or alternatively consist of, an amino acid sequence which is at least 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99% or 100%, identical to, for example, any of the amino acid sequences in (a), (b), (c), or (d), above, the amino acid sequence shown in SEQ ID NO:Y, the amino acid sequence encoded by the cDNA contained in Clone ID NO:Z, the amino acid sequence of the polypeptide encoded by the nucleotide sequence in SEQ ID NO:X as defined in columns 8 and 9 of Table 2, the amino acid sequence of the polypeptide encoded by the nucleotide sequence in SEQ ID NO:B as defined in column 6 of Table 1B, the amino acid sequence as defined in column 6 of Table 1A, an amino acid sequence encoded by the nucleotide sequence in SEQ ID NO:X, and an amino acid sequence encoded by the complement of the polynucleotide sequence in SEQ ID NO:X. Fragments of these polypeptides are also provided (e.g., those fragments described herein). Further proteins encoded by polynucleotides which hybridize to the complement of the nucleic acid molecules encoding these amino acid sequences under stringent hybridization conditions or alternatively, under lower

stringency conditions, are also encompassed by the invention, as are the polynucleotides encoding these proteins.

[0121] By a nucleic acid having a nucleotide sequence at least, for example, 95% "identical" to a reference nucleotide sequence of the present invention, it is intended that the nucleotide sequence of the nucleic acid is identical to the reference sequence except that the nucleotide sequence may include up to five point mutations per each 100 nucleotides of the reference nucleotide sequence encoding the polypeptide. In other words, to obtain a nucleic acid having a nucleotide sequence at least 95% identical to a reference nucleotide sequence, up to 5% of the nucleotides in the reference sequence may be deleted or substituted with another nucleotide, or a number of nucleotides up to 5% of the total nucleotides in the reference sequence may be inserted into the reference sequence. The query sequence may be an entire sequence referred to in Table 1A or 2 as the ORF (open reading frame), or any fragment specified, as described herein.

[0122] As a practical matter, whether any particular nucleic acid molecule or polypeptide is at least 80%, 85%, 90%, 95%, 96%, 97%, 98% or 99% identical to a nucleotide sequence of the present invention can be determined conventionally using known computer programs. A preferred method for determining the best overall match between a query sequence (a sequence of the present invention) and a subject sequence, also referred to as a global sequence alignment, can be determined using the FASTDB computer program based on the algorithm of Brutlag et al. (Comp. App. Biosci. 6:237-245 (1990)). In a sequence alignment the query and subject sequences are both DNA sequences. An RNA sequence can be compared by converting U's to T's. The result of said global sequence alignment is expressed as percent identity. Preferred parameters used in a FASTDB alignment of DNA sequences to calculate percent identity are: Matrix=Unitary, k-tuple=4, Mismatch Penalty=1, Joining Penalty=30, Randomization Group Length=0, Cutoff Score=1, Gap Penalty=5, Gap Size Penalty 0.05, Window Size=500 or the length of the subject nucleotide sequence, whichever is shorter.

[0123] If the subject sequence is shorter than the query sequence because of 5' or 3' deletions, not because of internal deletions, a manual correction must be made to the results. This is because the FASTDB program does not account for 5' and 3'

truncations of the subject sequence when calculating percent identity. For subject sequences truncated at the 5' or 3' ends, relative to the query sequence, the percent identity is corrected by calculating the number of bases of the query sequence that are 5' and 3' of the subject sequence, which are not matched/aligned, as a percent of the total bases of the query sequence. Whether a nucleotide is matched/aligned is determined by results of the FASTDB sequence alignment. This percentage is then subtracted from the percent identity, calculated by the above FASTDB program using the specified parameters, to arrive at a final percent identity score. This corrected score is what is used for the purposes of the present invention. Only bases outside the 5' and 3' bases of the subject sequence, as displayed by the FASTDB alignment, which are not matched/aligned with the query sequence, are calculated for the purposes of manually adjusting the percent identity score.

[0124] For example, a 90 base subject sequence is aligned to a 100 base query sequence to determine percent identity. The deletions occur at the 5' end of the subject sequence and therefore, the FASTDB alignment does not show a matched/alignment of the first 10 bases at 5' end. The 10 unpaired bases represent 10% of the sequence (number of bases at the 5' and 3' ends not matched/total number of bases in the query sequence) so 10% is subtracted from the percent identity score calculated by the FASTDB program. If the remaining 90 bases were perfectly matched the final percent identity would be 90%. In another example, a 90 base subject sequence is compared with a 100 base query sequence. This time the deletions are internal deletions so that there are no bases on the 5' or 3' of the subject sequence which are not matched/aligned with the query. In this case the percent identity calculated by FASTDB is not manually corrected. Once again, only bases 5' and 3' of the subject sequence which are not matched/aligned with the query sequence are manually corrected for. No other manual corrections are to be made for the purposes of the present invention.

[0125] By a polypeptide having an amino acid sequence at least, for example, 95% "identical" to a query amino acid sequence of the present invention, it is intended that the amino acid sequence of the subject polypeptide is identical to the query sequence except that the subject polypeptide sequence may include up to five amino acid alterations per each 100 amino acids of the query amino acid sequence. In other

words, to obtain a polypeptide having an amino acid sequence at least 95% identical to a query amino acid sequence, up to 5% of the amino acid residues in the subject sequence may be inserted, deleted, (indels) or substituted with another amino acid. These alterations of the reference sequence may occur at the amino or carboxy terminal positions of the reference amino acid sequence or anywhere between those terminal positions, interspersed either individually among residues in the reference sequence or in one or more contiguous groups within the reference sequence.

[0126] As a practical matter, whether any particular polypeptide is at least 80%, 85%, 90%, 95%, 96%, 97%, 98% or 99% identical to, for instance, the amino acid sequence of a polypeptide referred to in Table 1A (e.g., an amino acid sequence identified in columns 5 or 6) or Table 2 (e.g., the amino acid sequence of the polypeptide encoded by the polynucleotide sequence defined in columns 8 and 9 of Table 2) or a fragment thereof, the amino acid sequence of the polypeptide encoded by the polynucleotide sequence in SEQ ID NO:B as defined in column 6 of Table 1B or a fragment thereof, the amino acid sequence of the polypeptide encoded by the nucleotide sequence in SEQ ID NO:X or a fragment thereof, or an amino acid sequence of the polypeptide encoded by cDNA contained in Clone ID NO:Z, or a fragment thereof, can be determined conventionally using known computer programs. A preferred method for determining the best overall match between a query sequence (a sequence of the present invention) and a subject sequence, also referred to as a global sequence alignment, can be determined using the FASTDB computer program based on the algorithm of Brutlag et al. (Comp. App. Biosci.6:237-245 (1990)). In a sequence alignment the query and subject sequences are either both nucleotide sequences or both amino acid sequences. The result of said global sequence alignment is expressed as percent identity. Preferred parameters used in a FASTDB amino acid alignment are: Matrix=PAM 0, k-tuple=2, Mismatch Penalty=1, Joining Penalty=20, Randomization Group Length=0, Cutoff Score=1, Window Size=sequence length, Gap Penalty=5, Gap Size Penalty=0.05, Window Size=500 or the length of the subject amino acid sequence, whichever is shorter.

[0127] If the subject sequence is shorter than the query sequence due to N- or C-terminal deletions, not because of internal deletions, a manual correction must be made to the results. This is because the FASTDB program does not account for N-

and C-terminal truncations of the subject sequence when calculating global percent identity. For subject sequences truncated at the N- and C-termini, relative to the query sequence, the percent identity is corrected by calculating the number of residues of the query sequence that are N- and C-terminal of the subject sequence, which are not matched/aligned with a corresponding subject residue, as a percent of the total bases of the query sequence. Whether a residue is matched/aligned is determined by results of the FASTDB sequence alignment. This percentage is then subtracted from the percent identity, calculated by the above FASTDB program using the specified parameters, to arrive at a final percent identity score. This final percent identity score is what is used for the purposes of the present invention. Only residues to the N- and C-termini of the subject sequence, which are not matched/aligned with the query sequence, are considered for the purposes of manually adjusting the percent identity score. That is, only query residue positions outside the farthest N- and C- terminal residues of the subject sequence.

[0128] For example, a 90 amino acid residue subject sequence is aligned with a 100 residue query sequence to determine percent identity. The deletion occurs at the N-terminus of the subject sequence and therefore, the FASTDB alignment does not show a matching/alignment of the first 10 residues at the N-terminus. The 10 unpaired residues represent 10% of the sequence (number of residues at the N- and C- termini not matched/total number of residues in the query sequence) so 10% is subtracted from the percent identity score calculated by the FASTDB program. If the remaining 90 residues were perfectly matched the final percent identity would be 90%. In another example, a 90 residue subject sequence is compared with a 100 residue query sequence. This time the deletions are internal deletions so there are no residues at the N- or C-termini of the subject sequence which are not matched/aligned with the query. In this case the percent identity calculated by FASTDB is not manually corrected. Once again, only residue positions outside the N- and C-terminal ends of the subject sequence, as displayed in the FASTDB alignment, which are not matched/aligned with the query sequence are manually corrected for. No other manual corrections are to be made for the purposes of the present invention.

[0129] The polynucleotide variants of the invention may contain alterations in the coding regions, non-coding regions, or both. Especially preferred are polynucleotide

variants containing alterations which produce silent substitutions, additions, or deletions, but do not alter the properties or activities of the encoded polypeptide. Nucleotide variants produced by silent substitutions due to the degeneracy of the genetic code are preferred. Moreover, polypeptide variants in which less than 50, less than 40, less than 30, less than 20, less than 10, or 5-50, 5-25, 5-10, 1-5, or 1-2 amino acids are substituted, deleted, or added in any combination are also preferred. Polynucleotide variants can be produced for a variety of reasons, e.g., to optimize codon expression for a particular host (change codons in the human mRNA to those preferred by a bacterial host such as *E. coli*).

[0130] Naturally occurring variants are called "allelic variants," and refer to one of several alternate forms of a gene occupying a given locus on a chromosome of an organism. (Genes II, Lewin, B., ed., John Wiley & Sons, New York (1985).) These allelic variants can vary at either the polynucleotide and/or polypeptide level and are included in the present invention. Alternatively, non-naturally occurring variants may be produced by mutagenesis techniques or by direct synthesis.

[0131] Using known methods of protein engineering and recombinant DNA technology, variants may be generated to improve or alter the characteristics of the polypeptides of the present invention. For instance, one or more amino acids can be deleted from the N-terminus or C-terminus of the polypeptides of the present invention without substantial loss of biological function. As an example, the authors of Ron et al., J. Biol. Chem. 268: 2984-2988 (1993), reported variant KGF proteins having heparin binding activity even after deleting 3, 8, or 27 amino-terminal amino acid residues. Similarly, Interferon gamma exhibited up to ten times higher activity after deleting 8-10 amino acid residues from the carboxy terminus of this protein. (Dobeli et al., J. Biotechnology 7:199-216 (1988).)

[0132] Moreover, ample evidence demonstrates that variants often retain a biological activity similar to that of the naturally occurring protein. For example, Gayle and coworkers (J. Biol. Chem. 268:22105-22111 (1993)) conducted extensive mutational analysis of human cytokine IL-1a. They used random mutagenesis to generate over 3,500 individual IL-1a mutants that averaged 2.5 amino acid changes per variant over the entire length of the molecule. Multiple mutations were examined at every possible amino acid position. The investigators found that "[m]ost of the

molecule could be altered with little effect on either [binding or biological activity]." In fact, only 23 unique amino acid sequences, out of more than 3,500 nucleotide sequences examined, produced a protein that significantly differed in activity from wild-type.

[0133] Furthermore, even if deleting one or more amino acids from the N-terminus or C-terminus of a polypeptide results in modification or loss of one or more biological functions, other biological activities may still be retained. For example, the ability of a deletion variant to induce and/or to bind antibodies which recognize the secreted form will likely be retained when less than the majority of the residues of the secreted form are removed from the N-terminus or C-terminus. Whether a particular polypeptide lacking N- or C-terminal residues of a protein retains such immunogenic activities can readily be determined by routine methods described herein and otherwise known in the art.

[0134] Thus, the invention further includes polypeptide variants which show a functional activity (e.g., biological activity) of the polypeptides of the invention. Such variants include deletions, insertions, inversions, repeats, and substitutions selected according to general rules known in the art so as have little effect on activity.

[0135] The present application is directed to nucleic acid molecules at least 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99% or 100% identical to the nucleic acid sequences disclosed herein, (e.g., encoding a polypeptide having the amino acid sequence of an N and/or C terminal deletion), irrespective of whether they encode a polypeptide having functional activity. This is because even where a particular nucleic acid molecule does not encode a polypeptide having functional activity, one of skill in the art would still know how to use the nucleic acid molecule, for instance, as a hybridization probe or a polymerase chain reaction (PCR) primer. Uses of the nucleic acid molecules of the present invention that do not encode a polypeptide having functional activity include, *inter alia*, (1) isolating a gene or allelic or splice variants thereof in a cDNA library; (2) in situ hybridization (e.g., "FISH") to metaphase chromosomal spreads to provide precise chromosomal location of the gene, as described in Verma et al., Human Chromosomes: A Manual of Basic Techniques, Pergamon Press, New York (1988); (3) Northern Blot analysis for detecting mRNA expression in specific tissues (e.g., normal reproductive system tissues or diseased

reproductive system tissues); and (4) *in situ* hybridization (e.g., histochemistry) for detecting mRNA expression in specific tissues (e.g., normal reproductive system tissues or diseased reproductive system tissues).

[0136] Preferred, however, are nucleic acid molecules having sequences at least 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99% or 100% identical to the nucleic acid sequences disclosed herein, which do, in fact, encode a polypeptide having functional activity. By a polypeptide having "functional activity" is meant, a polypeptide capable of displaying one or more known functional activities associated with a full-length (complete) protein of the invention. Such functional activities include, but are not limited to, biological activity, antigenicity [ability to bind (or compete with a polypeptide of the invention for binding) to an anti-polypeptide of the invention antibody], immunogenicity (ability to generate antibody which binds to a specific polypeptide of the invention), ability to form multimers with polypeptides of the invention, and ability to bind to a receptor or ligand for a polypeptide of the invention.

[0137] The functional activity of the polypeptides, and fragments, variants and derivatives of the invention, can be assayed by various methods.

[0138] For example, in one embodiment where one is assaying for the ability to bind or compete with full-length polypeptide of the present invention for binding to an anti-polypeptide of the invention antibody, various immunoassays known in the art can be used, including but not limited to, competitive and non-competitive assay systems using techniques such as radioimmunoassays, ELISA (enzyme linked immunosorbent assay), "sandwich" immunoassays, immunoradiometric assays, gel diffusion precipitation reactions, immunodiffusion assays, *in situ* immunoassays (using colloidal gold, enzyme or radioisotope labels, for example), western blots, precipitation reactions, agglutination assays (e.g., gel agglutination assays, hemagglutination assays), complement fixation assays, immunofluorescence assays, protein A assays, and immunoelectrophoresis assays, etc. In one embodiment, antibody binding is detected by detecting a label on the primary antibody. In another embodiment, the primary antibody is detected by detecting binding of a secondary antibody or reagent to the primary antibody. In a further embodiment, the secondary antibody is labeled. Many means are known in the art for detecting binding in an immunoassay and are within the scope of the present invention.

[0139] In another embodiment, where a ligand is identified, or the ability of a polypeptide fragment, variant or derivative, of the invention to multimerize is being evaluated, binding can be assayed, e.g., by means well-known in the art, such as, for example, reducing and non-reducing gel chromatography, protein affinity chromatography, and affinity blotting. See generally, Phizicky et al., Microbiol. Rev. 59:94-123 (1995). In another embodiment, the ability of physiological correlates of a polypeptide of the present invention to bind to a substrate(s) of the polypeptide of the invention can be routinely assayed using techniques known in the art.

[0140] In addition, assays described herein (see Examples) and otherwise known in the art may routinely be applied to measure the ability of polypeptides of the present invention and fragments, variants and derivatives thereof to elicit polypeptide related biological activity (either *in vitro* or *in vivo*). Other methods will be known to the skilled artisan and are within the scope of the invention.

[0141] Of course, due to the degeneracy of the genetic code, one of ordinary skill in the art will immediately recognize that a large number of the nucleic acid molecules having a sequence at least 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99%, or 100% identical to, for example, the nucleic acid sequence of the cDNA contained in Clone ID NO:Z, a nucleic acid sequence referred to in Table 1A (e.g., SEQ ID NO:X), a nucleic acid sequence disclosed in Table 2 (e.g., the nucleic acid sequence delineated in columns 8 and 9) or fragments thereof, will encode polypeptides "having functional activity." In fact, since degenerate variants of any of these nucleotide sequences all encode the same polypeptide, in many instances, this will be clear to the skilled artisan even without performing the above described comparison assay. It will be further recognized in the art that, for such nucleic acid molecules that are not degenerate variants, a reasonable number will also encode a polypeptide having functional activity. This is because the skilled artisan is fully aware of amino acid substitutions that are either less likely or not likely to significantly effect protein function (e.g., replacing one aliphatic amino acid with a second aliphatic amino acid), as further described below.

[0142] For example, guidance concerning how to make phenotypically silent amino acid substitutions is provided in Bowie et al., "Deciphering the Message in Protein Sequences: Tolerance to Amino Acid Substitutions," Science 247:1306-1310

(1990), wherein the authors indicate that there are two main strategies for studying the tolerance of an amino acid sequence to change.

[0143] The first strategy exploits the tolerance of amino acid substitutions by natural selection during the process of evolution. By comparing amino acid sequences in different species, conserved amino acids can be identified. These conserved amino acids are likely important for protein function. In contrast, the amino acid positions where substitutions have been tolerated by natural selection indicates that these positions are not critical for protein function. Thus, positions tolerating amino acid substitution could be modified while still maintaining biological activity of the protein.

[0144] The second strategy uses genetic engineering to introduce amino acid changes at specific positions of a cloned gene to identify regions critical for protein function. For example, site directed mutagenesis or alanine-scanning mutagenesis (introduction of single alanine mutations at every residue in the molecule) can be used. See Cunningham et al., Science 244:1081-1085 (1989). The resulting mutant molecules can then be tested for biological activity.

[0145] As the authors state, these two strategies have revealed that proteins are surprisingly tolerant of amino acid substitutions. The authors further indicate which amino acid changes are likely to be permissive at certain amino acid positions in the protein. For example, most buried (within the tertiary structure of the protein) amino acid residues require nonpolar side chains, whereas few features of surface side chains are generally conserved. Moreover, tolerated conservative amino acid substitutions involve replacement of the aliphatic or hydrophobic amino acids Ala, Val, Leu and Ile; replacement of the hydroxyl residues Ser and Thr; replacement of the acidic residues Asp and Glu; replacement of the amide residues Asn and Gln, replacement of the basic residues Lys, Arg, and His; replacement of the aromatic residues Phe, Tyr, and Trp, and replacement of the small-sized amino acids Ala, Ser, Thr, Met, and Gly. Besides conservative amino acid substitutions, variants of the present invention include (i) substitutions with one or more of the non-conserved amino acid residues, where the substituted amino acid residues may or may not be one encoded by the genetic code, or (ii) substitutions with one or more of the amino acid residues having a substituent group, or (iii) fusion of the mature polypeptide with another compound, such as a compound to increase the stability and/or solubility of the polypeptide (for example,

polyethylene glycol), or (iv) fusion of the polypeptide with additional amino acids, such as, for example, an IgG Fc fusion region peptide, serum albumin (preferably human serum albumin) or a fragment or variant thereof, or leader or secretory sequence, or a sequence facilitating purification. Such variant polypeptides are deemed to be within the scope of those skilled in the art from the teachings herein.

[0146] For example, polypeptide variants containing amino acid substitutions of charged amino acids with other charged or neutral amino acids may produce proteins with improved characteristics, such as less aggregation. Aggregation of pharmaceutical formulations both reduces activity and increases clearance due to the aggregate's immunogenic activity. See Pinckard et al., Clin. Exp. Immunol. 2:331-340 (1967); Robbins et al., Diabetes 36: 838-845 (1987); Cleland et al., Crit. Rev. Therapeutic Drug Carrier Systems 10:307-377 (1993).

[0147] A further embodiment of the invention relates to polypeptides which comprise the amino acid sequence of a polypeptide having an amino acid sequence which contains at least one amino acid substitution, but not more than 50 amino acid substitutions, even more preferably, not more than 40 amino acid substitutions, still more preferably, not more than 30 amino acid substitutions, and still even more preferably, not more than 20 amino acid substitutions from a polypeptide sequence disclosed herein. Of course it is highly preferable for a polypeptide to have an amino acid sequence which comprises the amino acid sequence of a polypeptide of SEQ ID NO:Y, an amino acid sequence encoded by SEQ ID NO:X, an amino acid sequence encoded by the portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2, an amino acid sequence encoded by the complement of SEQ ID NO:X, and/or the amino acid sequence encoded by cDNA contained in Clone ID NO:Z which contains, in order of ever-increasing preference, at least one, but not more than 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1 amino acid substitutions.

[0148] In specific embodiments, the polypeptides of the invention comprise, or alternatively, consist of, fragments or variants of a reference amino acid sequence selected from: (a) the amino acid sequence of SEQ ID NO:Y or fragments thereof (e.g., the mature form and/or other fragments described herein); (b) the amino acid sequence encoded by SEQ ID NO:X or fragments thereof; (c) the amino acid sequence encoded by the complement of SEQ ID NO:X or fragments thereof; (d) the amino acid

sequence encoded by the portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2 or fragments thereof; and (e) the amino acid sequence encoded by cDNA contained in Clone ID NO:Z or fragments thereof; wherein the fragments or variants have 1-5, 5-10, 5-25, 5-50, 10-50 or 50-150, amino acid residue additions, substitutions, and/or deletions when compared to the reference amino acid sequence. In preferred embodiments, the amino acid substitutions are conservative. Polynucleotides encoding these polypeptides are also encompassed by the invention.

Polynucleotide and Polypeptide Fragments

[0149] The present invention is also directed to polynucleotide fragments of the polynucleotides (nucleic acids) of the invention. In the present invention, a "polynucleotide fragment" refers to a polynucleotide having a nucleic acid sequence which, for example: is a portion of the cDNA contained in Clone ID NO:Z or the complementary strand thereto; is a portion of the polynucleotide sequence encoding the polypeptide encoded by the cDNA contained in Clone ID NO:Z or the complementary strand thereto; is a portion of a polynucleotide sequence encoding the amino acid sequence encoded by the region of SEQ ID NO:X as defined in columns 8 and 9 of Table 2 or the complementary strand thereto; is a portion of the polynucleotide sequence of SEQ ID NO:X as defined in columns 8 and 9 of Table 2 or the complementary strand thereto; is a portion of the polynucleotide sequence in SEQ ID NO:X or the complementary strand thereto; is a polynucleotide sequence encoding a portion of the polypeptide of SEQ ID NO:Y; is a polynucleotide sequence encoding a portion of a polypeptide encoded by SEQ ID NO:X; is a polynucleotide sequence encoding a portion of a polypeptide encoded by the complement of the polynucleotide sequence in SEQ ID NO:X; is a portion of a polynucleotide sequence encoding the amino acid sequence encoded by the region of SEQ ID NO:B as defined in column 6 of Table 1B or the complementary strand thereto; or is a portion of the polynucleotide sequence of SEQ ID NO:B as defined in column 6 of Table 1B or the complementary strand thereto.

[0150] The polynucleotide fragments of the invention are preferably at least about 15 nt, and more preferably at least about 20 nt, still more preferably at least about 30 nt, and even more preferably, at least about 40 nt, at least about 50 nt, at least about 75

nt, or at least about 150 nt in length. A fragment "at least 20 nt in length," for example, is intended to include 20 or more contiguous bases from the cDNA sequence contained in Clone ID NO:Z, or the nucleotide sequence shown in SEQ ID NO:X or the complementary strand thereto. In this context "about" includes the particularly recited value or a value larger or smaller by several (5, 4, 3, 2, or 1) nucleotides, at either terminus or at both termini. These nucleotide fragments have uses that include, but are not limited to, as diagnostic probes and primers as discussed herein. Of course, larger fragments (e.g., at least 160, 170, 180, 190, 200, 250, 500, 600, 1000, or 2000 nucleotides in length) are also encompassed by the invention.

[0151] Moreover, representative examples of polynucleotide fragments of the invention, comprise, or alternatively consist of, a sequence from about nucleotide number 1-50, 51-100, 101-150, 151-200, 201-250, 251-300, 301-350, 351-400, 401-450, 451-500, 501-550, 551-600, 651-700, 701-750, 751-800, 800-850, 851-900, 901-950, 951-1000, 1001-1050, 1051-1100, 1101-1150, 1151-1200, 1201-1250, 1251-1300, 1301-1350, 1351-1400, 1401-1450, 1451-1500, 1501-1550, 1551-1600, 1601-1650, 1651-1700, 1701-1750, 1751-1800, 1801-1850, 1851-1900, 1901-1950, 1951-2000, 2001-2050, 2051-2100, 2101-2150, 2151-2200, 2201-2250, 2251-2300, 2301-2350, 2351-2400, 2401-2450, 2451-2500, 2501-2550, 2551-2600, 2601-2650, 2651-2700, 2701-2750, 2751-2800, 2801-2850, 2851-2900, 2901-2950, 2951-3000, 3001-3050, 3051-3100, 3101-3150, 3151-3200, 3201-3250, 3251-3300, 3301-3350, 3351-3400, 3401-3450, 3451-3500, 3501-3550, 3551-3600, 3601-3650, 3651-3700, 3701-3750, 3751-3800, 3801-3850, 3851-3900, 3901-3950, 3951-4000, 4001-4050, 4051-4100, 4101-4150, 4151-4200, 4201-4250, 4251-4300, 4301-4350, 4351-4400, 4401-4450, 4451-4500, 4501-4550, 4551-4600, 4601-4650, 4651-4700, 4701-4750, 4751-4800, 4801-4850, 4851-4900, 4901-4950, 4951-5000, 5001-5050, 5051-5100, 5101-5150, 5151-5200, 5201-5250, 5251-5300, 5301-5350, 5351-5400, 5401-5450, 5451-5500, 5501-5550, 5551-5600, 5601-5650, 5651-5700, 5701-5750, 5751-5800, 5801-5850, 5851-5900, 5901-5950, 5951-6000, 6001-6050, 6051-6100, 6101-6150, 6151-6200, 6201-6250, 6251-6300, 6301-6350, 6351-6400, 6401-6450, 6451-6500, 6501-6550, 6551-6600, 6601-6650, 6651-6700, 6701-6750, 6751-6800, 6801-6850, 6851-6900, 6901-6950, 6951-7000, 7001-7050, 7051-7100, 7101-7150, 7151-7200, 7201-7250, 7251-7300 or 7301 to the end of SEQ ID NO:X, or the complementary strand

thereto. In this context "about" includes the particularly recited range or a range larger or smaller by several (5, 4, 3, 2, or 1) nucleotides, at either terminus or at both termini. Preferably, these fragments encode a polypeptide which has a functional activity (e.g., biological activity). More preferably, these polynucleotides can be used as probes or primers as discussed herein. Polynucleotides which hybridize to one or more of these polynucleotides under stringent hybridization conditions or alternatively, under lower stringency conditions are also encompassed by the invention, as are polypeptides encoded by these polynucleotides.

[0152] Further representative examples of polynucleotide fragments of the invention, comprise, or alternatively consist of, a sequence from about nucleotide number 1-50, 51-100, 101-150, 151-200, 201-250, 251-300, 301-350, 351-400, 401-450, 451-500, 501-550, 551-600, 651-700, 701-750, 751-800, 800-850, 851-900, 901-950, 951-1000, 1001-1050, 1051-1100, 1101-1150, 1151-1200, 1201-1250, 1251-1300, 1301-1350, 1351-1400, 1401-1450, 1451-1500, 1501-1550, 1551-1600, 1601-1650, 1651-1700, 1701-1750, 1751-1800, 1801-1850, 1851-1900, 1901-1950, 1951-2000, 2001-2050, 2051-2100, 2101-2150, 2151-2200, 2201-2250, 2251-2300, 2301-2350, 2351-2400, 2401-2450, 2451-2500, 2501-2550, 2551-2600, 2601-2650, 2651-2700, 2701-2750, 2751-2800, 2801-2850, 2851-2900, 2901-2950, 2951-3000, 3001-3050, 3051-3100, 3101-3150, 3151-3200, 3201-3250, 3251-3300, 3301-3350, 3351-3400, 3401-3450, 3451-3500, 3501-3550, 3551-3600, 3601-3650, 3651-3700, 3701-3750, 3751-3800, 3801-3850, 3851-3900, 3901-3950, 3951-4000, 4001-4050, 4051-4100, 4101-4150, 4151-4200, 4201-4250, 4251-4300, 4301-4350, 4351-4400, 4401-4450, 4451-4500, 4501-4550, 4551-4600, 4601-4650, 4651-4700, 4701-4750, 4751-4800, 4801-4850, 4851-4900, 4901-4950, 4951-5000, 5001-5050, 5051-5100, 5101-5150, 5151-5200, 5201-5250, 5251-5300, 5301-5350, 5351-5400, 5401-5450, 5451-5500, 5501-5550, 5551-5600, 5601-5650, 5651-5700, 5701-5750, 5751-5800, 5801-5850, 5851-5900, 5901-5950, 5951-6000, 6001-6050, 6051-6100, 6101-6150, 6151-6200, 6201-6250, 6251-6300, 6301-6350, 6351-6400, 6401-6450, 6451-6500, 6501-6550, 6551-6600, 6601-6650, 6651-6700, 6701-6750, 6751-6800, 6801-6850, 6851-6900, 6901-6950, 6951-7000, 7001-7050, 7051-7100, 7101-7150, 7151-7200, 7201-7250, 7251-7300 or 7301 to the end of the cDNA sequence contained in Clone ID NO:Z, or the complementary strand thereto. In this context "about" includes the

particularly recited range or a range larger or smaller by several (5, 4, 3, 2, or 1) nucleotides, at either terminus or at both termini. Preferably, these fragments encode a polypeptide which has a functional activity (e.g., biological activity). More preferably, these polynucleotides can be used as probes or primers as discussed herein. Polynucleotides which hybridize to one or more of these polynucleotides under stringent hybridization conditions or alternatively, under lower stringency conditions are also encompassed by the invention, as are polypeptides encoded by these polynucleotides.

[0153] Moreover, representative examples of polynucleotide fragments of the invention comprise, or alternatively consist of, a nucleic acid sequence comprising one, two, three, four, five, six, seven, eight, nine, ten, or more of the above described polynucleotide fragments of the invention in combination with a polynucleotide sequence delineated in Table 1B column 6. Additional, representative examples of polynucleotide fragments of the invention comprise, or alternatively consist of, a nucleic acid sequence comprising one, two, three, four, five, six, seven, eight, nine, ten, or more of the above described polynucleotide fragments of the invention in combination with a polynucleotide sequence that is the complementary strand of a sequence delineated in column 6 of Table 1B. In further embodiments, the above-described polynucleotide fragments of the invention comprise, or alternatively consist of, sequences delineated in Table 1B, column 6, and have a nucleic acid sequence which is different from that of the BAC fragment having the sequence disclosed in SEQ ID NO:B (see Table 1B, column 5). In additional embodiments, the above-described polynucleotide fragments of the invention comprise, or alternatively consist of, sequences delineated in Table 1B, column 6, and have a nucleic acid sequence which is different from that published for the BAC clone identified as BAC ID NO:A (see Table 1B, column 4). In additional embodiments, the above-described polynucleotides of the invention comprise, or alternatively consist of, sequences delineated Table 1B, column 6, and have a nucleic acid sequence which is different from that contained in the BAC clone identified as BAC ID NO:A (see Table 1B, column 4). Polypeptides encoded by these polynucleotides, other polynucleotides that encode these polypeptides, and antibodies that bind these polypeptides are also

encompassed by the invention. Additionally, fragments and variants of the above-described polynucleotides and polypeptides are also encompassed by the invention.

[0154] In additional specific embodiments, polynucleotides of the invention comprise, or alternatively consist of, one, two, three, four, five, six, seven, eight, nine, ten, or more fragments of the sequences delineated in column 6 of Table 1B, and the polynucleotide sequence of SEQ ID NO:X (e.g., as defined in Table 1B, column 2) or fragments or variants thereof. Polypeptides encoded by these polynucleotides, other polynucleotides that encode these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention.

[0155] In additional specific embodiments, polynucleotides of the invention comprise, or alternatively consist of, one, two, three, four, five, six, seven, eight, nine, ten, or more fragments of the sequences delineated in column 6 of Table 1B which correspond to the same Clone ID NO:Z (see Table 1B, column 1), and the polynucleotide sequence of SEQ ID NO:X (e.g., as defined in Table 1A or 1B) or fragments or variants thereof. Polypeptides encoded by these polynucleotides, other polynucleotides that encode these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention.

[0156] In further specific embodiments, polynucleotides of the invention comprise, or alternatively consist of, one, two, three, four, five, six, seven, eight, nine, ten, or more fragments of the sequences delineated in the same row of column 6 of Table 1B, and the polynucleotide sequence of SEQ ID NO:X (e.g., as defined in Table 1A or 1B) or fragments or variants thereof. Polypeptides encoded by these polynucleotides, other polynucleotides that encode these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention.

[0157] In additional specific embodiments, polynucleotides of the invention comprise, or alternatively consist of a polynucleotide sequence in which the 3' 10 polynucleotides of one of the sequences delineated in column 6 of Table 1B and the 5' 10 polynucleotides of the sequence of SEQ ID NO:X are directly contiguous. Nucleic acids which hybridize to the complement of these 20 contiguous polynucleotides under stringent hybridization conditions or alternatively, under lower stringency conditions, are also encompassed by the invention. Polypeptides encoded by these polynucleotides and/or nucleic acids, other polynucleotides and/or nucleic acids that

encode these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention. Additionally, fragments and variants of the above-described polynucleotides, nucleic acids, and polypeptides are also encompassed by the invention.

[0158] In additional specific embodiments, polynucleotides of the invention comprise, or alternatively consist of a polynucleotide sequence in which the 3' 10 polynucleotides of one of the sequences delineated in column 6 of Table 1B and the 5' 10 polynucleotides of a fragment or variant of the sequence of SEQ ID NO:X (e.g., as described herein) are directly contiguous. Nucleic acids which hybridize to the complement of these 20 contiguous polynucleotides under stringent hybridization conditions or alternatively, under lower stringency conditions, are also encompassed by the invention. Polypeptides encoded by these polynucleotides and/or nucleic acids, other polynucleotides and/or nucleic acids encoding these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention. Additionally, fragments and variants of the above-described polynucleotides, nucleic acids, and polypeptides are also encompassed by the invention.

[0159] In further specific embodiments, polynucleotides of the invention comprise, or alternatively consist of a polynucleotide sequence in which the 3' 10 polynucleotides of a fragment or variant of the sequence of SEQ ID NO:X and the 5' 10 polynucleotides of the sequence of one of the sequences delineated in column 6 of Table 1B are directly contiguous. Nucleic acids which hybridize to the complement of these 20 contiguous polynucleotides under stringent hybridization conditions or alternatively, under lower stringency conditions, are also encompassed by the invention. Polypeptides encoded by these polynucleotides and/or nucleic acids, other polynucleotides and/or nucleic acids encoding these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention. Additionally, fragments and variants of the above-described polynucleotides, nucleic acids, and polypeptides are also encompassed by the invention.

[0160] In specific embodiments, polynucleotides of the invention comprise, or alternatively consist of a polynucleotide sequence in which the 3' 10 polynucleotides of one of the sequences delineated in column 6 of Table 1B and the 5' 10 polynucleotides of another sequence in column 6 are directly contiguous. In preferred

embodiments, the 3' 10 polynucleotides of one of the sequences delineated in column 6 of Table 1B is directly contiguous with the 5' 10 polynucleotides of the next sequential exon delineated in Table 1B, column 6. Nucleic acids which hybridize to the complement of these 20 contiguous polynucleotides under stringent hybridization conditions or alternatively, under lower stringency conditions, are also encompassed by the invention. Polypeptides encoded by these polynucleotides and/or nucleic acids, other polynucleotides and/or nucleic acids encoding these polypeptides, and antibodies that bind these polypeptides are also encompassed by the invention. Additionally, fragments and variants of the above-described polynucleotides, nucleic acids, and polypeptides are also encompassed by the invention.

[0161] In the present invention, a "polypeptide fragment" refers to an amino acid sequence which is a portion of that contained in SEQ ID NO:Y, a portion of an amino acid sequence encoded by the portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2, a portion of an amino acid sequence encoded by the polynucleotide sequence of SEQ ID NO:X, a portion of an amino acid sequence encoded by the complement of the polynucleotide sequence in SEQ ID NO:X, and/or a portion of an amino acid sequence encoded by the cDNA contained in Clone ID NO:Z. Protein (polypeptide) fragments may be "free-standing," or comprised within a larger polypeptide of which the fragment forms a part or region, most preferably as a single continuous region. Representative examples of polypeptide fragments of the invention, include, for example, fragments comprising, or alternatively consisting of, from about amino acid number 1-20, 21-40, 41-60, 61-80, 81-100, 102-120, 121-140, 141-160, 161-180, 181-200, 201-220, 221-240, 241-260, 261-280, 281-300, 301-320, 321-340, 341-360, 361-380, 381-400, 401-420, 421-440, 441-460, 461-480, 481-500, 501-520, 521-540, 541-560, 561-580, 581-600, 601-620, 621-640, 641-660, 661-680, 681-700, 701-720, 721-740, 741-760, 761-780, 781-800, 801-820, 821-840, 841-860, 861-880, 881-900, 901-920, 921-940, 941-960, 961-980, 981-1000, 1001-1020, 1021-1040, 1041-1060, 1061-1080, 1081-1100, 1101-1120, 1121-1140, 1141-1160, 1161-1180, 1181-1200, 1201-1220, 1221-1240, 1241-1260, 1261-1280, 1281-1300, 1301-1320, 1321-1340, 1341-1360, 1361-1380, 1381-1400, 1401-1420, 1421-1440, or 1441 to the end of the coding region. In a preferred embodiment, polypeptide fragments of the invention include, for example, fragments comprising, or alternatively consisting

of, from about amino acid number 1-20, 21-40, 41-60, 61-80, 81-100, 102-120, 121-140, 141-160, 161-180, 181-200, 201-220, 221-240, 241-260, 261-280, 281-300, 301-320, 321-340, 341-360, 361-380, 381-400, 401-420, 421-440, 441-460, 461-480, 481-500, 501-520, 521-540, 541-560, 561-580, 581-600, 601-620, 621-640, 641-660, 661-680, 681-700, 701-720, 721-740, 741-760, 761-780, 781-800, 801-820, 821-840, 841-860, 861-880, 881-900, 901-920, 921-940, 941-960, 961-980, 981-1000, 1001-1020, 1021-1040, 1041-1060, 1061-1080, 1081-1100, 1101-1120, 1121-1140, 1141-1160, 1161-1180, 1181-1200, 1201-1220, 1221-1240, 1241-1260, 1261-1280, 1281-1300, 1301-1320, 1321-1340, 1341-1360, 1361-1380, 1381-1400, 1401-1420, 1421-1440, or 1441 to the end of the coding region of SEQ ID NO:Y. Moreover, polypeptide fragments of the invention may be at least about 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 100, 110, 120, 130, 140, or 150 amino acids in length. In this context "about" includes the particularly recited ranges or values, or ranges or values larger or smaller by several (5, 4, 3, 2, or 1) amino acids, at either extreme or at both extremes. Polynucleotides encoding these polypeptide fragments are also encompassed by the invention.

[0162] Even if deletion of one or more amino acids from the N-terminus of a protein results in modification or loss of one or more biological functions of the protein, other functional activities (e.g., biological activities, ability to multimerize, ability to bind a ligand) may still be retained. For example, the ability of shortened muteins to induce and/or bind to antibodies which recognize the complete or mature forms of the polypeptides generally will be retained when less than the majority of the residues of the complete or mature polypeptide are removed from the N-terminus. Whether a particular polypeptide lacking N-terminal residues of a complete polypeptide retains such immunologic activities can readily be determined by routine methods described herein and otherwise known in the art. It is not unlikely that a mutein with a large number of deleted N-terminal amino acid residues may retain some biological or immunogenic activities. In fact, peptides composed of as few as six amino acid residues may often evoke an immune response.

[0163] Accordingly, polypeptide fragments include the secreted protein as well as the mature form. Further preferred polypeptide fragments include the secreted protein or the mature form having a continuous series of deleted residues from the amino or

the carboxy terminus, or both. For example, any number of amino acids, ranging from 1-60, can be deleted from the amino terminus of either the secreted polypeptide or the mature form. Similarly, any number of amino acids, ranging from 1-30, can be deleted from the carboxy terminus of the secreted protein or mature form. Furthermore, any combination of the above amino and carboxy terminus deletions is preferred. Similarly, polynucleotides encoding these polypeptide fragments are also preferred.

[0164] The present invention further provides polypeptides having one or more residues deleted from the amino terminus of the amino acid sequence of a polypeptide disclosed herein (e.g., a polypeptide of SEQ ID NO:Y, a polypeptide encoded by the polynucleotide sequence contained in SEQ ID NO:X or the complement thereof, a polypeptide encoded by the portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2, a polypeptide encoded by the portion of SEQ ID NO:B as defined in column 6 of Table 1B, and/or a polypeptide encoded by the cDNA contained in Clone ID NO:Z). In particular, N-terminal deletions may be described by the general formula m-q, where q is a whole integer representing the total number of amino acid residues in a polypeptide of the invention (e.g., the polypeptide disclosed in SEQ ID NO:Y, or the polypeptide encoded by the portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2), and m is defined as any integer ranging from 2 to q-6. Polynucleotides encoding these polypeptides are also encompassed by the invention.

[0165] The present invention further provides polypeptides having one or more residues from the carboxy terminus of the amino acid sequence of a polypeptide disclosed herein (e.g., a polypeptide of SEQ ID NO:Y, a polypeptide encoded by the polynucleotide sequence contained in SEQ ID NO:X, a polypeptide encoded by the portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2, and/or a polypeptide encoded by the cDNA contained in Clone ID NO:Z). In particular, C-terminal deletions may be described by the general formula 1-n, where n is any whole integer ranging from 6 to q-1, and where n corresponds to the position of amino acid residue in a polypeptide of the invention. Polynucleotides encoding these polypeptides are also encompassed by the invention.

[0166] In addition, any of the above described N- or C-terminal deletions can be combined to produce a N- and C-terminal deleted polypeptide. The invention also

provides polypeptides having one or more amino acids deleted from both the amino and the carboxyl termini, which may be described generally as having residues m-n of a polypeptide encoded by SEQ ID NO:X (e.g., including, but not limited to, the preferred polypeptide disclosed as SEQ ID NO:Y and the polypeptide encoded by the portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2), the cDNA contained in Clone ID NO:Z, and/or the complement thereof, where n and m are integers as described above. Polynucleotides encoding these polypeptides are also encompassed by the invention.

[0167] Also as mentioned above, even if deletion of one or more amino acids from the C-terminus of a protein results in modification or loss of one or more biological functions of the protein, other functional activities (e.g., biological activities, ability to multimerize, ability to bind a ligand) may still be retained. For example the ability of the shortened mutein to induce and/or bind to antibodies which recognize the complete or mature forms of the polypeptide generally will be retained when less than the majority of the residues of the complete or mature polypeptide are removed from the C-terminus. Whether a particular polypeptide lacking C-terminal residues of a complete polypeptide retains such immunologic activities can readily be determined by routine methods described herein and otherwise known in the art. It is not unlikely that a mutein with a large number of deleted C-terminal amino acid residues may retain some biological or immunogenic activities. In fact, peptides composed of as few as six amino acid residues may often evoke an immune response.

[0168] The present application is also directed to proteins containing polypeptides at least 80%, 85%, 90%, 95%, 96%, 97%, 98% or 99% identical to a polypeptide sequence set forth herein. In preferred embodiments, the application is directed to proteins containing polypeptides at least 80%, 85%, 90%, 95%, 96%, 97%, 98% or 99% identical to polypeptides having the amino acid sequence of the specific N- and C-terminal deletions. Polynucleotides encoding these polypeptides are also encompassed by the invention.

[0169] Any polypeptide sequence encoded by, for example, the polynucleotide sequences set forth as SEQ ID NO:X or the complement thereof, (presented, for example, in Tables 1A and 2), the cDNA contained in Clone ID NO:Z, or the polynucleotide sequence as defined in column 6 of Table 1B, may be analyzed to

determine certain preferred regions of the polypeptide. For example, the amino acid sequence of a polypeptide encoded by a polynucleotide sequence of SEQ ID NO:X (e.g., the polypeptide of SEQ ID NO:Y and the polypeptide encoded by the portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2) or the cDNA contained in Clone ID NO:Z may be analyzed using the default parameters of the DNASTAR computer algorithm (DNASTAR, Inc., 1228 S. Park St., Madison, WI 53715 USA; <http://www.dnastar.com/>).

[0170] Polypeptide regions that may be routinely obtained using the DNASTAR computer algorithm include, but are not limited to, Garnier-Robson alpha-regions, beta-regions, turn-regions, and coil-regions; Chou-Fasman alpha-regions, beta-regions, and turn-regions; Kyte-Doolittle hydrophilic regions and hydrophobic regions; Eisenberg alpha- and beta-amphipathic regions; Karplus-Schulz flexible regions; Emini surface-forming regions; and Jameson-Wolf regions of high antigenic index. Among highly preferred polynucleotides of the invention in this regard are those that encode polypeptides comprising regions that combine several structural features, such as several (e.g., 1, 2, 3 or 4) of the features set out above.

[0171] Additionally, Kyte-Doolittle hydrophilic regions and hydrophobic regions, Emini surface-forming regions, and Jameson-Wolf regions of high antigenic index (i.e., containing four or more contiguous amino acids having an antigenic index of greater than or equal to 1.5, as identified using the default parameters of the Jameson-Wolf program) can routinely be used to determine polypeptide regions that exhibit a high degree of potential for antigenicity. Regions of high antigenicity are determined from data by DNASTAR analysis by choosing values which represent regions of the polypeptide which are likely to be exposed on the surface of the polypeptide in an environment in which antigen recognition may occur in the process of initiation of an immune response.

[0172] Preferred polypeptide fragments of the invention are fragments comprising, or alternatively, consisting of, an amino acid sequence that displays a functional activity (e.g. biological activity) of the polypeptide sequence of which the amino acid sequence is a fragment. By a polypeptide displaying a "functional activity" is meant a polypeptide capable of one or more known functional activities associated with a full-

length protein, such as, for example, biological activity, antigenicity, immunogenicity, and/or multimerization, as described herein.

[0173] Other preferred polypeptide fragments are biologically active fragments. Biologically active fragments are those exhibiting activity similar, but not necessarily identical, to an activity of the polypeptide of the present invention. The biological activity of the fragments may include an improved desired activity, or a decreased undesirable activity.

[0174] In preferred embodiments, polypeptides of the invention comprise, or alternatively consist of, one, two, three, four, five or more of the antigenic fragments of the polypeptide of SEQ ID NO:Y, or portions thereof. Polynucleotides encoding these polypeptides are also encompassed by the invention.

[0175] The present invention encompasses polypeptides comprising, or alternatively consisting of, an epitope of: the polypeptide sequence shown in SEQ ID NO:Y; a polypeptide sequence encoded by SEQ ID NO:X or the complementary strand thereto; the polypeptide sequence encoded by the portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2; the polypeptide sequence encoded by the portion of SEQ ID NO:B as defined in column 6 of Table 1B or the complement thereto; the polypeptide sequence encoded by the cDNA contained in Clone ID NO:Z; or the polypeptide sequence encoded by a polynucleotide that hybridizes to the sequence of SEQ ID NO:X, the complement of the sequence of SEQ ID NO:X, the complement of a portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2, or the cDNA sequence contained in Clone ID NO:Z under stringent hybridization conditions or alternatively, under lower stringency hybridization as defined *supra*. The present invention further encompasses polynucleotide sequences encoding an epitope of a polypeptide sequence of the invention (such as, for example, the sequence disclosed in SEQ ID NO:X, or a fragment thereof), polynucleotide sequences of the complementary strand of a polynucleotide sequence encoding an epitope of the invention, and polynucleotide sequences which hybridize to the complementary strand under stringent hybridization conditions or alternatively, under lower stringency hybridization conditions defined *supra*.

[0176] The term "epitopes," as used herein, refers to portions of a polypeptide having antigenic or immunogenic activity in an animal, preferably a mammal, and

most preferably in a human. In a preferred embodiment, the present invention encompasses a polypeptide comprising an epitope, as well as the polynucleotide encoding this polypeptide. An "immunogenic epitope," as used herein, is defined as a portion of a protein that elicits an antibody response in an animal, as determined by any method known in the art, for example, by the methods for generating antibodies described *infra*. (See, for example, Geysen et al., Proc. Natl. Acad. Sci. USA 81:3998-4002 (1983)). The term "antigenic epitope," as used herein, is defined as a portion of a protein to which an antibody can immunospecifically bind its antigen as determined by any method well known in the art, for example, by the immunoassays described herein. Immunospecific binding excludes non-specific binding but does not necessarily exclude cross-reactivity with other antigens. Antigenic epitopes need not necessarily be immunogenic.

[0177] Fragments which function as epitopes may be produced by any conventional means. (See, e.g., Houghten, R. A., Proc. Natl. Acad. Sci. USA 82:5131-5135 (1985) further described in U.S. Patent No. 4,631,211.)

[0178] In the present invention, antigenic epitopes preferably contain a sequence of at least 4, at least 5, at least 6, at least 7, more preferably at least 8, at least 9, at least 10, at least 11, at least 12, at least 13, at least 14, at least 15, at least 20, at least 25, at least 30, at least 40, at least 50, and, most preferably, between about 15 to about 30 amino acids. Preferred polypeptides comprising immunogenic or antigenic epitopes are at least 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, or 100 amino acid residues in length. Additional non-exclusive preferred antigenic epitopes include the antigenic epitopes disclosed herein, as well as portions thereof. Antigenic epitopes are useful, for example, to raise antibodies, including monoclonal antibodies, that specifically bind the epitope. Preferred antigenic epitopes include the antigenic epitopes disclosed herein, as well as any combination of two, three, four, five or more of these antigenic epitopes. Antigenic epitopes can be used as the target molecules in immunoassays. (See, for instance, Wilson et al., Cell 37:767-778 (1984); Sutcliffe et al., Science 219:660-666 (1983)).

[0179] Non-limiting examples of epitopes of polypeptides that can be used to generate antibodies of the invention include a polypeptide comprising, or alternatively consisting of, at least one, two, three, four, five, six or more of the portion(s) of SEQ

ID NO:Y specified in column 6 of Table 1A. These polypeptide fragments have been determined to bear antigenic epitopes of the proteins of the invention by the analysis of the Jameson-Wolf antigenic index which is included in the DNASTar suite of computer programs. By "comprise" it is intended that a polypeptide contains at least one, two, three, four, five, six or more of the portion(s) of SEQ ID NO:Y shown in column 6 of Table 1A, but it may contain additional flanking residues on either the amino or carboxyl termini of the recited portion. Such additional flanking sequences are preferably sequences naturally found adjacent to the portion; i.e., contiguous sequence shown in SEQ ID NO:Y. The flanking sequence may, however, be sequences from a heterologous polypeptide, such as from another protein described herein or from a heterologous polypeptide not described herein. In particular embodiments, epitope portions of a polypeptide of the invention comprise one, two, three, or more of the portions of SEQ ID NO:Y shown in column 6 of Table 1A. Polynucleotides encoding these polypeptides are also encompassed by the invention.

[0180] Similarly, immunogenic epitopes can be used, for example, to induce antibodies according to methods well known in the art. See, for instance, Sutcliffe et al., *supra*; Wilson et al., *supra*; Chow et al., Proc. Natl. Acad. Sci. USA 82:910-914; and Bittle et al., J. Gen. Virol. 66:2347-2354 (1985). Preferred immunogenic epitopes include the immunogenic epitopes disclosed herein, as well as any combination of two, three, four, five or more of these immunogenic epitopes. The polypeptides comprising one or more immunogenic epitopes may be presented for eliciting an antibody response together with a carrier protein, such as an albumin, to an animal system (such as rabbit or mouse), or, if the polypeptide is of sufficient length (at least about 25 amino acids), the polypeptide may be presented without a carrier. However, immunogenic epitopes comprising as few as 8 to 10 amino acids have been shown to be sufficient to raise antibodies capable of binding to, at the very least, linear epitopes in a denatured polypeptide (e.g., in Western blotting).

[0181] Epitope-bearing polypeptides of the present invention may be used to induce antibodies according to methods well known in the art including, but not limited to, *in vivo* immunization, *in vitro* immunization, and phage display methods. See, e.g., Sutcliffe et al., *supra*; Wilson et al., *supra*, and Bittle et al., J. Gen. Virol., 66:2347-2354 (1985). If *in vivo* immunization is used, animals may be immunized

with free peptide; however, anti-peptide antibody titer may be boosted by coupling the peptide to a macromolecular carrier, such as keyhole limpet hemacyanin (KLH) or tetanus toxoid. For instance, peptides containing cysteine residues may be coupled to a carrier using a linker such as maleimidobenzoyl- N-hydroxysuccinimide ester (MBS), while other peptides may be coupled to carriers using a more general linking agent such as glutaraldehyde. Animals such as rabbits, rats and mice are immunized with either free or carrier- coupled peptides, for instance, by intraperitoneal and/or intradermal injection of emulsions containing about 100 µg of peptide or carrier protein and Freund's adjuvant or any other adjuvant known for stimulating an immune response. Several booster injections may be needed, for instance, at intervals of about two weeks, to provide a useful titer of anti-peptide antibody which can be detected, for example, by ELISA assay using free peptide adsorbed to a solid surface. The titer of anti-peptide antibodies in serum from an immunized animal may be increased by selection of anti-peptide antibodies, for instance, by adsorption to the peptide on a solid support and elution of the selected antibodies according to methods well known in the art.

[0182] As one of skill in the art will appreciate, and as discussed above, the polypeptides of the present invention (e.g., those comprising an immunogenic or antigenic epitope) can be fused to heterologous polypeptide sequences. For example, polypeptides of the present invention (including fragments or variants thereof), may be fused with the constant domain of immunoglobulins (IgA, IgE, IgG, IgM), or portions thereof (CH1, CH2, CH3, or any combination thereof and portions thereof, resulting in chimeric polypeptides. By way of another non-limiting example, polypeptides and/or antibodies of the present invention (including fragments or variants thereof) may be fused with albumin (including but not limited to recombinant human serum albumin or fragments or variants thereof (see, e.g., U.S. Patent No. 5,876,969, issued March 2, 1999, EP Patent 0 413 622, and U.S. Patent No. 5,766,883, issued June 16, 1998, herein incorporated by reference in their entirety)). In a preferred embodiment, polypeptides and/or antibodies of the present invention (including fragments or variants thereof) are fused with the mature form of human serum albumin (i.e., amino acids 1 – 585 of human serum albumin as shown in Figures 1 and 2 of EP Patent 0 322 094) which is herein incorporated by reference in its entirety. In another preferred

embodiment, polypeptides and/or antibodies of the present invention (including fragments or variants thereof) are fused with polypeptide fragments comprising, or alternatively consisting of, amino acid residues 1-z of human serum albumin, where z is an integer from 369 to 419, as described in U.S. Patent 5,766,883 herein incorporated by reference in its entirety. Polypeptides and/or antibodies of the present invention (including fragments or variants thereof) may be fused to either the N- or C-terminal end of the heterologous protein (e.g., immunoglobulin Fc polypeptide or human serum albumin polypeptide). Polynucleotides encoding fusion proteins of the invention are also encompassed by the invention.

[0183] Such fusion proteins as those described above may facilitate purification and may increase half-life *in vivo*. This has been shown for chimeric proteins consisting of the first two domains of the human CD4-polypeptide and various domains of the constant regions of the heavy or light chains of mammalian immunoglobulins. See, e.g., EP 394,827; Traunecker et al., *Nature*, 331:84-86 (1988). Enhanced delivery of an antigen across the epithelial barrier to the immune system has been demonstrated for antigens (e.g., insulin) conjugated to an FcRn binding partner such as IgG or Fc fragments (see, e.g., PCT Publications WO 96/22024 and WO 99/04813). IgG Fusion proteins that have a disulfide-linked dimeric structure due to the IgG portion disulfide bonds have also been found to be more efficient in binding and neutralizing other molecules than monomeric polypeptides or fragments thereof alone. See, e.g., Fountoulakis et al., *J. Biochem.*, 270:3958-3964 (1995). Nucleic acids encoding the above epitopes can also be recombined with a gene of interest as an epitope tag (e.g., the hemagglutinin (iHAi) tag or flag tag) to aid in detection and purification of the expressed polypeptide. For example, a system described by Janknecht et al. allows for the ready purification of non-denatured fusion proteins expressed in human cell lines (Janknecht et al., 1991, *Proc. Natl. Acad. Sci. USA* 88:8972- 897). In this system, the gene of interest is subcloned into a vaccinia recombination plasmid such that the open reading frame of the gene is translationally fused to an amino-terminal tag consisting of six histidine residues. The tag serves as a matrix binding domain for the fusion protein. Extracts from cells infected with the recombinant vaccinia virus are loaded onto Ni²⁺ nitriloacetic acid-agarose column

and histidine-tagged proteins can be selectively eluted with imidazole-containing buffers.

Fusion Proteins

[0184] Any polypeptide of the present invention can be used to generate fusion proteins. For example, the polypeptide of the present invention, when fused to a second protein, can be used as an antigenic tag. Antibodies raised against the polypeptide of the present invention can be used to indirectly detect the second protein by binding to the polypeptide. Moreover, because secreted proteins target cellular locations based on trafficking signals, polypeptides of the present invention which are shown to be secreted can be used as targeting molecules once fused to other proteins.

[0185] Examples of domains that can be fused to polypeptides of the present invention include not only heterologous signal sequences, but also other heterologous functional regions. The fusion does not necessarily need to be direct, but may occur through linker sequences.

[0186] In certain preferred embodiments, proteins of the invention are fusion proteins comprising an amino acid sequence that is an N and/or C- terminal deletion of a polypeptide of the invention. In preferred embodiments, the invention is directed to a fusion protein comprising an amino acid sequence that is at least 80%, 85%, 90%, 95%, 96%, 97%, 98% or 99% identical to a polypeptide sequence of the invention. Polynucleotides encoding these proteins are also encompassed by the invention.

[0187] Moreover, fusion proteins may also be engineered to improve characteristics of the polypeptide of the present invention. For instance, a region of additional amino acids, particularly charged amino acids, may be added to the N-terminus of the polypeptide to improve stability and persistence during purification from the host cell or subsequent handling and storage. Also, peptide moieties may be added to the polypeptide to facilitate purification. Such regions may be removed prior to final preparation of the polypeptide. The addition of peptide moieties to facilitate handling of polypeptides are familiar and routine techniques in the art.

[0188] As one of skill in the art will appreciate that, as discussed above, polypeptides of the present invention, and epitope-bearing fragments thereof, can be combined with heterologous polypeptide sequences. For example, the polypeptides of

the present invention may be fused with heterologous polypeptide sequences, for example, the polypeptides of the present invention may be fused with the constant domain of immunoglobulins (IgA, IgE, IgG, IgM) or portions thereof (CH1, CH2, CH3, and any combination thereof, including both entire domains and portions thereof), or albumin (including, but not limited to, native or recombinant human albumin or fragments or variants thereof (see, e.g., U.S. Patent No. 5,876,969, issued March 2, 1999, EP Patent 0 413 622, and U.S. Patent No. 5,766,883, issued June 16, 1998, herein incorporated by reference in their entirety)), resulting in chimeric polypeptides. For example, EP-A-O 464 533 (Canadian counterpart 2045869) discloses fusion proteins comprising various portions of constant region of immunoglobulin molecules together with another human protein or part thereof. In many cases, the Fc part in a fusion protein is beneficial in therapy and diagnosis, and thus can result in, for example, improved pharmacokinetic properties (EP-A 0232 262). Alternatively, deleting the Fc part after the fusion protein has been expressed, detected, and purified, would be desired. For example, the Fc portion may hinder therapy and diagnosis if the fusion protein is used as an antigen for immunizations. In drug discovery, for example, human proteins, such as hIL-5, have been fused with Fc portions for the purpose of high-throughput screening assays to identify antagonists of hIL-5. See, D. Bennett et al., *J. Molecular Recognition* 8:52-58 (1995); K. Johanson et al., *J. Biol. Chem.* 270:9459-9471 (1995).

[0189] Moreover, the polypeptides of the present invention can be fused to marker sequences, such as a polypeptide which facilitates purification of the fused polypeptide. In preferred embodiments, the marker amino acid sequence is a hexa-histidine peptide, such as the tag provided in a pQE vector (QIAGEN, Inc., 9259 Eton Avenue, Chatsworth, CA, 91311), among others, many of which are commercially available. As described in Gentz et al., *Proc. Natl. Acad. Sci. USA* 86:821-824 (1989), for instance, hexa-histidine provides for convenient purification of the fusion protein. Another peptide tag useful for purification, the "HA" tag, corresponds to an epitope derived from the influenza hemagglutinin protein (Wilson et al., *Cell* 37:767 (1984).)

[0190] Additional fusion proteins of the invention may be generated through the techniques of gene-shuffling, motif-shuffling, exon-shuffling, and/or codon-shuffling

(collectively referred to as "DNA shuffling"), briefly described below, and further described herein. DNA shuffling may be employed to modulate the activities of polypeptides of the invention, such methods can be used to generate polypeptides with altered activity, as well as agonists and antagonists of the polypeptides. See, generally, U.S. Patent Nos. 5,605,793; 5,811,238; 5,830,721; 5,834,252; and 5,837,458, and Patten et al., Curr. Opinion Biotechnol. 8:724-33 (1997); Harayama, Trends Biotechnol. 16(2):76-82 (1998); Hansson et al., J. Mol. Biol. 287:265-76 (1999); and Lorenzo and Blasco, Biotechniques 24(2):308-13 (1998); each of these patents and publications are hereby incorporated by reference in its entirety). In a preferred embodiment, one or more components, motifs, sections, parts, domains, fragments, etc., of a polynucleotide encoding a polypeptide of the invention may be recombined with one or more components, motifs, sections, parts, domains, fragments, etc., of one or more heterologous molecules encoding a heterologous polypeptide.

[0191] Thus, any of these above fusions can be engineered using the polynucleotides or the polypeptides of the present invention.

Recombinant and Synthetic Production of Polypeptides of the Invention

[0192] The present invention also relates to vectors containing the polynucleotide of the present invention, host cells, and the production of polypeptides by synthetic and recombinant techniques. The vector may be, for example, a phage, plasmid, viral, or retroviral vector. Retroviral vectors may be replication competent or replication defective. In the latter case, viral propagation generally will occur only in complementing host cells.

[0193] The polynucleotides of the invention may be joined to a vector containing a selectable marker for propagation in a host. Generally, a plasmid vector is introduced in a precipitate, such as a calcium phosphate precipitate, or in a complex with a charged lipid. If the vector is a virus, it may be packaged *in vitro* using an appropriate packaging cell line and then transduced into host cells.

[0194] The polynucleotide insert should be operatively linked to an appropriate promoter, such as the phage lambda PL promoter, the *E. coli lac*, *trp*, *phoA* and *tac* promoters, the SV40 early and late promoters and promoters of retroviral LTRs, to

name a few. Other suitable promoters will be known to the skilled artisan. The expression constructs will further contain sites for transcription initiation, termination, and, in the transcribed region, a ribosome binding site for translation. The coding portion of the transcripts expressed by the constructs will preferably include a translation initiating codon at the beginning and a termination codon (UAA, UGA or UAG) appropriately positioned at the end of the polypeptide to be translated.

[0195] As indicated, the expression vectors will preferably include at least one selectable marker. Such markers include dihydrofolate reductase, G418 or neomycin resistance, glutamine synthase, for eukaryotic cell culture and tetracycline, kanamycin or ampicillin resistance genes for culturing in *E. coli* and other bacteria. Representative examples of appropriate hosts include, but are not limited to, bacterial cells, such as *E. coli*, *Streptomyces* and *Salmonella typhimurium* cells; fungal cells, such as yeast cells (e.g., *Saccharomyces cerevisiae* or *Pichia pastoris* (ATCC Accession No. 201178)); insect cells such as *Drosophila* S2 and *Spodoptera* Sf9 cells; animal cells such as CHO, COS, 293, NSO and Bowes melanoma cells; and plant cells. Appropriate culture mediums and conditions for the above-described host cells are known in the art.

[0196] Among vectors preferred for use in bacteria include pQE70, pQE60 and pQE-9, available from QIAGEN, Inc.; pBluescript vectors, Phagescript vectors, pNH8A, pNH16a, pNH18A, pNH46A, available from Stratagene Cloning Systems, Inc.; and ptrc99a, pKK223-3, pKK233-3, pDR540, pRIT5 available from Pharmacia Biotech, Inc. Among preferred eukaryotic vectors are pWLNEO, pSV2CAT, pOG44, pXT1 and pSG available from Stratagene; and pSVK3, pBPV, pMSG and pSVL available from Pharmacia. Preferred expression vectors for use in yeast systems include, but are not limited to pYES2, pYD1, pTEF1/Zeo, pYES2/GS, pPICZ, pGAPZ, pGAPZalph, pPIC9, pPIC3.5, pHIL-D2, pHIL-S1, pPIC3.5K, pPIC9K, and PAO815 (all available from Invitrogen, Carlsbad, CA). Other suitable vectors will be readily apparent to the skilled artisan.

[0197] Vectors which use glutamine synthase (GS) or DHFR as the selectable markers can be amplified in the presence of the drugs methionine sulfoximine or methotrexate, respectively. An advantage of glutamine synthase based vectors is the availability of cell lines (e.g., the murine myeloma cell line, NS0) which are glutamine

synthase negative. Glutamine synthase expression systems can also function in glutamine synthase expressing cells (e.g., Chinese Hamster Ovary (CHO) cells) by providing additional inhibitor to prevent the functioning of the endogenous gene. A glutamine synthase expression system and components thereof are detailed in PCT publications: WO87/04462; WO86/05807; WO89/01036; WO89/10404; and WO91/06657 which are hereby incorporated in their entireties by reference herein. Additionally, glutamine synthase expression vectors can be obtained from Lonza Biologics, Inc. (Portsmouth, NH). Expression and production of monoclonal antibodies using a GS expression system in murine myeloma cells is described in Bebbington et al., *Bio/technology* 10:169(1992) and in Biblia and Robinson *Biotechnol. Prog.* 11:1 (1995) which are herein incorporated by reference.

[0198] The present invention also relates to host cells containing the above-described vector constructs described herein, and additionally encompasses host cells containing nucleotide sequences of the invention that are operably associated with one or more heterologous control regions (e.g., promoter and/or enhancer) using techniques known of in the art. The host cell can be a higher eukaryotic cell, such as a mammalian cell (e.g., a human derived cell), or a lower eukaryotic cell, such as a yeast cell, or the host cell can be a prokaryotic cell, such as a bacterial cell. A host strain may be chosen which modulates the expression of the inserted gene sequences, or modifies and processes the gene product in the specific fashion desired. Expression from certain promoters can be elevated in the presence of certain inducers; thus expression of the genetically engineered polypeptide may be controlled. Furthermore, different host cells have characteristics and specific mechanisms for the translational and post-translational processing and modification (e.g., phosphorylation, cleavage) of proteins. Appropriate cell lines can be chosen to ensure the desired modifications and processing of the foreign protein expressed.

[0199] Introduction of the nucleic acids and nucleic acid constructs of the invention into the host cell can be effected by calcium phosphate transfection, DEAE-dextran mediated transfection, cationic lipid-mediated transfection, electroporation, transduction, infection, or other methods. Such methods are described in many standard laboratory manuals, such as Davis et al., *Basic Methods In Molecular*

Biology (1986). It is specifically contemplated that the polypeptides of the present invention may in fact be expressed by a host cell lacking a recombinant vector.

[0200] In addition to encompassing host cells containing the vector constructs discussed herein, the invention also encompasses primary, secondary, and immortalized host cells of vertebrate origin, particularly mammalian origin, that have been engineered to delete or replace endogenous genetic material (e.g., reproductive system antigen coding sequence), and/or to include genetic material (e.g., heterologous polynucleotide sequences) that is operably associated with reproductive system associated polynucleotides of the invention, and which activates, alters, and/or amplifies endogenous reproductive system associated polynucleotides. For example, techniques known in the art may be used to operably associate heterologous control regions (e.g., promoter and/or enhancer) and endogenous reproductive system associated polynucleotide sequences via homologous recombination (see, e.g., U.S. Patent Number 5,641,670, issued June 24, 1997; International Publication Number WO 96/29411; International Publication Number WO 94/12650; Koller et al., Proc. Natl. Acad. Sci. USA 86:8932-8935 (1989); and Zijlstra et al., Nature 342:435-438 (1989), the disclosures of each of which are incorporated by reference in their entireties).

[0201] Polypeptides of the present invention can also be recovered from: products purified from natural sources, including bodily fluids, tissues and cells, whether directly isolated or cultured; products of chemical synthetic procedures; and products produced by recombinant techniques from a prokaryotic or eukaryotic host, including, for example, bacterial, yeast, higher plant, insect, and mammalian cells. Depending upon the host employed in a recombinant production procedure, the polypeptides of the present invention may be glycosylated or may be non-glycosylated. In addition, polypeptides of the invention may also include an initial modified methionine residue, in some cases as a result of host-mediated processes. Thus, it is well known in the art that the N-terminal methionine encoded by the translation initiation codon generally is removed with high efficiency from any protein after translation in all eukaryotic cells. While the N-terminal methionine on most proteins also is efficiently removed in most prokaryotes, for some proteins, this prokaryotic removal process is inefficient,

depending on the nature of the amino acid to which the N-terminal methionine is covalently linked.

[0202] In one embodiment, the yeast *Pichia pastoris* is used to express polypeptides of the invention in a eukaryotic system. *Pichia pastoris* is a methylotrophic yeast which can metabolize methanol as its sole carbon source. A main step in the methanol metabolism pathway is the oxidation of methanol to formaldehyde using O₂. This reaction is catalyzed by the enzyme alcohol oxidase. In order to metabolize methanol as its sole carbon source, *Pichia pastoris* must generate high levels of alcohol oxidase due, in part, to the relatively low affinity of alcohol oxidase for O₂. Consequently, in a growth medium depending on methanol as a main carbon source, the promoter region of one of the two alcohol oxidase genes (*AOX1*) is highly active. In the presence of methanol, alcohol oxidase produced from the *AOX1* gene comprises up to approximately 30% of the total soluble protein in *Pichia pastoris*. See, Ellis, S.B., *et al.*, *Mol. Cell. Biol.* 5:1111-21 (1985); Koutz, P.J., *et al.*, *Yeast* 5:167-77 (1989); Tschopp, J.F., *et al.*, *Nucl. Acids Res.* 15:3859-76 (1987). Thus, a heterologous coding sequence, such as, for example, a polynucleotide of the present invention, under the transcriptional regulation of all or part of the *AOX1* regulatory sequence is expressed at exceptionally high levels in *Pichia* yeast grown in the presence of methanol.

[0203] In one example, the plasmid vector pPIC9K is used to express DNA encoding a polypeptide of the invention, as set forth herein, in a *Pichea* yeast system essentially as described in "*Pichia* Protocols: Methods in Molecular Biology," D.R. Higgins and J. Cregg, eds. The Humana Press, Totowa, NJ, 1998. This expression vector allows expression and secretion of a polypeptide of the invention by virtue of the strong *AOX1* promoter linked to the *Pichia pastoris* alkaline phosphatase (PHO) secretory signal peptide (i.e., leader) located upstream of a multiple cloning site.

[0204] Many other yeast vectors could be used in place of pPIC9K, such as, pYES2, pYD1, pTEF1/Zeo, pYES2/GS, pPICZ, pGAPZ, pGAPZalpha, pPIC9, pPIC3.5, pHIL-D2, pHIL-S1, pPIC3.5K, and PAO815, as one skilled in the art would readily appreciate, as long as the proposed expression construct provides appropriately

located signals for transcription, translation, secretion (if desired), and the like, including an in-frame AUG as required.

[0205] In another embodiment, high-level expression of a heterologous coding sequence, such as, for example, a polynucleotide of the present invention, may be achieved by cloning the heterologous polynucleotide of the invention into an expression vector such as, for example, pGAPZ or pGAPZalpha, and growing the yeast culture in the absence of methanol.

[0206] In addition to encompassing host cells containing the vector constructs discussed herein, the invention also encompasses primary, secondary, and immortalized host cells of vertebrate origin, particularly mammalian origin, that have been engineered to delete or replace endogenous genetic material (e.g., coding sequence), and/or to include genetic material (e.g., heterologous polynucleotide sequences) that is operably associated with polynucleotides of the invention, and which activates, alters, and/or amplifies endogenous polynucleotides. For example, techniques known in the art may be used to operably associate heterologous control regions (e.g., promoter and/or enhancer) and endogenous polynucleotide sequences via homologous recombination (see, e.g., U.S. Patent No. 5,641,670, issued June 24, 1997; International Publication No. WO 96/29411, published September 26, 1996; International Publication No. WO 94/12650, published August 4, 1994; Koller et al., Proc. Natl. Acad. Sci. USA 86:8932-8935 (1989); and Zijlstra et al., Nature 342:435-438 (1989), the disclosures of each of which are incorporated by reference in their entireties).

[0207] In addition, polypeptides of the invention can be chemically synthesized using techniques known in the art (e.g., see Creighton, 1983, Proteins: Structures and Molecular Principles, W.H. Freeman & Co., N.Y., and Hunkapiller et al., Nature, 310:105-111 (1984)). For example, a polypeptide corresponding to a fragment of a polypeptide can be synthesized by use of a peptide synthesizer. Furthermore, if desired, nonclassical amino acids or chemical amino acid analogs can be introduced as a substitution or addition into the polypeptide sequence. Non-classical amino acids include, but are not limited to, to the D-isomers of the common amino acids, 2,4-diaminobutyric acid, α -amino isobutyric acid, 4-aminobutyric acid, Abu, 2-amino butyric acid, g-Abu, e-Ahx, 6-amino hexanoic acid, Aib, 2-amino isobutyric acid,

3-amino propionic acid, ornithine, norleucine, norvaline, hydroxyproline, sarcosine, citrulline, homocitrulline, cysteic acid, t-butylglycine, t-butylalanine, phenylglycine, cyclohexylalanine, β -alanine, fluoro-amino acids, designer amino acids such as β -methyl amino acids, Ca-methyl amino acids, Na-methyl amino acids, and amino acid analogs in general. Furthermore, the amino acid can be D (dextrorotary) or L (levorotary).

[0208] The invention encompasses polypeptides of the present invention which are differentially modified during or after translation, e.g., by glycosylation, acetylation, phosphorylation, amidation, derivatization by known protecting/blocking groups, proteolytic cleavage, linkage to an antibody molecule or other cellular ligand, etc. Any of numerous chemical modifications may be carried out by known techniques, including but not limited, to specific chemical cleavage by cyanogen bromide, trypsin, chymotrypsin, papain, V8 protease, NaBH_4 ; acetylation, formylation, oxidation, reduction; metabolic synthesis in the presence of tunicamycin; etc.

[0209] Additional post-translational modifications encompassed by the invention include, for example, e.g., N-linked or O-linked carbohydrate chains, processing of N-terminal or C-terminal ends), attachment of chemical moieties to the amino acid backbone, chemical modifications of N-linked or O-linked carbohydrate chains, and addition or deletion of an N-terminal methionine residue as a result of procaryotic host cell expression. The polypeptides may also be modified with a detectable label, such as an enzymatic, fluorescent, isotopic or affinity label to allow for detection and isolation of the protein.

[0210] Examples of suitable enzymes include horseradish peroxidase, alkaline phosphatase, beta-galactosidase, or acetylcholinesterase; examples of suitable prosthetic group complexes include streptavidin/biotin and avidin/biotin; examples of suitable fluorescent materials include umbelliferone, fluorescein, fluorescein isothiocyanate, rhodamine, dichlorotriazinylamine fluorescein, dansyl chloride or phycoerythrin; an example of a luminescent material includes luminol; examples of bioluminescent materials include luciferase, luciferin, and aequorin; and examples of suitable radioactive material include iodine (^{121}I , ^{123}I , ^{125}I , ^{131}I), carbon (^{14}C), sulfur (^{35}S), tritium (^3H), indium (^{111}In , ^{112}In , $^{113\text{m}}\text{In}$, $^{115\text{m}}\text{In}$), technetium (^{99}Tc , $^{99\text{m}}\text{Tc}$), thallium (^{201}Tl), gallium (^{68}Ga , ^{67}Ga), palladium (^{103}Pd), molybdenum (^{99}Mo), xenon

(¹³³Xe), fluorine (¹⁸F), ¹⁵³Sm, ¹⁷⁷Lu, ¹⁵⁹Gd, ¹⁴⁹Pm, ¹⁴⁰La, ¹⁷⁵Yb, ¹⁶⁶Ho, ⁹⁰Y, ⁴⁷Sc, ¹⁸⁶Re, ¹⁸⁸Re, ¹⁴²Pr, ¹⁰⁵Rh, and ⁹⁷Ru.

[0211] In specific embodiments, a polypeptide of the present invention or fragment or variant thereof is attached to macrocyclic chelators that associate with radiometal ions, including but not limited to, ¹⁷⁷Lu, ⁹⁰Y, ¹⁶⁶Ho, and ¹⁵³Sm, to polypeptides. In a preferred embodiment, the radiometal ion associated with the macrocyclic chelators is ¹¹¹In. In another preferred embodiment, the radiometal ion associated with the macrocyclic chelator is ⁹⁰Y. In specific embodiments, the macrocyclic chelator is 1,4,7,10-tetraazacyclododecane-N,N',N'',N'''-tetraacetic acid (DOTA). In other specific embodiments, DOTA is attached to an antibody of the invention or fragment thereof via a linker molecule. Examples of linker molecules useful for conjugating DOTA to a polypeptide are commonly known in the art - see, for example, DeNardo et al., Clin Cancer Res. 4(10):2483-90 (1998); Peterson et al., Bioconjug. Chem. 10(4):553-7 (1999); and Zimmerman et al, Nucl. Med. Biol. 26(8):943-50 (1999); which are hereby incorporated by reference in their entirety.

[0212] As mentioned, the reproductive system associated proteins of the invention may be modified by either natural processes, such as posttranslational processing, or by chemical modification techniques which are well known in the art. It will be appreciated that the same type of modification may be present in the same or varying degrees at several sites in a given reproductive system associated polypeptide. Reproductive system associated polypeptides may be branched, for example, as a result of ubiquitination, and they may be cyclic, with or without branching. Cyclic, branched, and branched cyclic reproductive system associated polypeptides may result from posttranslation natural processes or may be made by synthetic methods. Modifications include acetylation, acylation, ADP-ribosylation, amidation, covalent attachment of flavin, covalent attachment of a heme moiety, covalent attachment of a nucleotide or nucleotide derivative, covalent attachment of a lipid or lipid derivative, covalent attachment of phosphatidylinositol, cross-linking, cyclization, disulfide bond formation, demethylation, formation of covalent cross-links, formation of cysteine, formation of pyroglutamate, formylation, gamma-carboxylation, glycosylation, GPI anchor formation, hydroxylation, iodination, methylation, myristoylation, oxidation, pegylation, proteolytic processing, phosphorylation, prenylation, racemization,

selenoylation, sulfation, transfer-RNA mediated addition of amino acids to proteins such as arginylation, and ubiquitination. (See, for instance, PROTEINS - STRUCTURE AND MOLECULAR PROPERTIES, 2nd Ed., T. E. Creighton, W. H. Freeman and Company, New York (1993); POSTTRANSLATIONAL COVALENT MODIFICATION OF PROTEINS, B. C. Johnson, Ed., Academic Press, New York, pgs. 1-12 (1983); Seifter et al., Meth. Enzymol. 182:626-646 (1990); Rattan et al., Ann. N.Y. Acad. Sci. 663:48-62 (1992)).

[0213] Also provided by the invention are chemically modified derivatives of the polypeptides of the invention which may provide additional advantages such as increased solubility, stability and circulating time of the polypeptide, or decreased immunogenicity (see U.S. Patent No. 4,179,337). The chemical moieties for derivitization may be selected from water soluble polymers such as polyethylene glycol, ethylene glycol/propylene glycol copolymers, carboxymethylcellulose, dextran, polyvinyl alcohol and the like. The polypeptides may be modified at random positions within the molecule, or at predetermined positions within the molecule and may include one, two, three or more attached chemical moieties.

[0214] The polymer may be of any molecular weight, and may be branched or unbranched. For polyethylene glycol, the preferred molecular weight is between about 1 kDa and about 100 kDa (the term "about" indicating that in preparations of polyethylene glycol, some molecules will weigh more, some less, than the stated molecular weight) for ease in handling and manufacturing. Other sizes may be used, depending on the desired therapeutic profile (e.g., the duration of sustained release desired, the effects, if any on biological activity, the ease in handling, the degree or lack of antigenicity and other known effects of the polyethylene glycol to a therapeutic protein or analog). For example, the polyethylene glycol may have an average molecular weight of about 200, 500, 1000, 1500, 2000, 2500, 3000, 3500, 4000, 4500, 5000, 5500, 6000, 6500, 7000, 7500, 8000, 8500, 9000, 9500, 10,000, 10,500, 11,000, 11,500, 12,000, 12,500, 13,000, 13,500, 14,000, 14,500, 15,000, 15,500, 16,000, 16,500, 17,000, 17,500, 18,000, 18,500, 19,000, 19,500, 20,000, 25,000, 30,000, 35,000, 40,000, 50,000, 55,000, 60,000, 65,000, 70,000, 75,000, 80,000, 85,000, 90,000, 95,000, or 100,000 kDa.

[0215] As noted above, the polyethylene glycol may have a branched structure.

Branched polyethylene glycols are described, for example, in U.S. Patent No. 5,643,575; Morpurgo et al., *Appl. Biochem. Biotechnol.* 56:59-72 (1996); Vorobjev et al., *Nucleosides Nucleotides* 18:2745-2750 (1999); and Caliceti et al., *Bioconjug. Chem.* 10:638-646 (1999), the disclosures of each of which are incorporated herein by reference.

[0216] The polyethylene glycol molecules (or other chemical moieties) should be attached to the protein with consideration of effects on functional or antigenic domains of the protein. There are a number of attachment methods available to those skilled in the art, such as, for example, the method disclosed in EP 0 401 384 (coupling PEG to G-CSF), herein incorporated by reference; see also Malik et al., *Exp. Hematol.* 20:1028-1035 (1992), reporting pegylation of GM-CSF using tresyl chloride. For example, polyethylene glycol may be covalently bound through amino acid residues via a reactive group, such as a free amino or carboxyl group. Reactive groups are those to which an activated polyethylene glycol molecule may be bound. The amino acid residues having a free amino group may include lysine residues and the N-terminal amino acid residues; those having a free carboxyl group may include aspartic acid residues glutamic acid residues and the C-terminal amino acid residue. Sulfhydryl groups may also be used as a reactive group for attaching the polyethylene glycol molecules. Preferred for therapeutic purposes is attachment at an amino group, such as attachment at the N-terminus or lysine group.

[0217] As suggested above, polyethylene glycol may be attached to proteins via linkage to any of a number of amino acid residues. For example, polyethylene glycol can be linked to proteins via covalent bonds to lysine, histidine, aspartic acid, glutamic acid, or cysteine residues. One or more reaction chemistries may be employed to attach polyethylene glycol to specific amino acid residues (e.g., lysine, histidine, aspartic acid, glutamic acid, or cysteine) of the protein or to more than one type of amino acid residue (e.g., lysine, histidine, aspartic acid, glutamic acid, cysteine and combinations thereof) of the protein.

[0218] One may specifically desire proteins chemically modified at the N-terminus. Using polyethylene glycol as an illustration of the present composition, one may select from a variety of polyethylene glycol molecules (by molecular weight, branching, etc.), the proportion of polyethylene glycol molecules to protein

(polypeptide) molecules in the reaction mix, the type of pegylation reaction to be performed, and the method of obtaining the selected N-terminally pegylated protein. The method of obtaining the N-terminally pegylated preparation (i.e., separating this moiety from other monopegylated moieties if necessary) may be by purification of the N-terminally pegylated material from a population of pegylated protein molecules. Selective proteins chemically modified at the N-terminus modification may be accomplished by reductive alkylation which exploits differential reactivity of different types of primary amino groups (lysine versus the N-terminal) available for derivatization in a particular protein. Under the appropriate reaction conditions, substantially selective derivatization of the protein at the N-terminus with a carbonyl group containing polymer is achieved.

[0219] As indicated above, pegylation of the proteins of the invention may be accomplished by any number of means. For example, polyethylene glycol may be attached to the protein either directly or by an intervening linker. Linkerless systems for attaching polyethylene glycol to proteins are described in Delgado et al., *Crit. Rev. Thera. Drug Carrier Sys.* 9:249-304 (1992); Francis et al., *Intern. J. of Hematol.* 68:1-18 (1998); U.S. Patent No. 4,002,531; U.S. Patent No. 5,349,052; WO 95/06058; and WO 98/32466, the disclosures of each of which are incorporated herein by reference.

[0220] One system for attaching polyethylene glycol directly to amino acid residues of proteins without an intervening linker employs tresylated MPEG, which is produced by the modification of monmethoxy polyethylene glycol (MPEG) using tresylchloride ($\text{ClSO}_2\text{CH}_2\text{CF}_3$). Upon reaction of protein with tresylated MPEG, polyethylene glycol is directly attached to amine groups of the protein. Thus, the invention includes protein-polyethylene glycol conjugates produced by reacting proteins of the invention with a polyethylene glycol molecule having a 2,2,2-trifluoroethane sulphonyl group.

[0221] Polyethylene glycol can also be attached to proteins using a number of different intervening linkers. For example, U.S. Patent No. 5,612,460, the entire disclosure of which is incorporated herein by reference, discloses urethane linkers for connecting polyethylene glycol to proteins. Protein-polyethylene glycol conjugates wherein the polyethylene glycol is attached to the protein by a linker can also be produced by reaction of proteins with compounds such as MPEG-

succinimidylsuccinate, MPEG activated with 1,1'-carbonyldiimidazole, MPEG-2,4,5-trichloropenylcarbonate, MPEG-p-nitrophenolcarbonate, and various MPEG-succinate derivatives. A number of additional polyethylene glycol derivatives and reaction chemistries for attaching polyethylene glycol to proteins are described in International Publication No. WO 98/32466, the entire disclosure of which is incorporated herein by reference. Pegylated protein products produced using the reaction chemistries set out herein are included within the scope of the invention.

[0222] The number of polyethylene glycol moieties attached to each protein of the invention (i.e., the degree of substitution) may also vary. For example, the pegylated proteins of the invention may be linked, on average, to 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 17, 20, or more polyethylene glycol molecules. Similarly, the average degree of substitution within ranges such as 1-3, 2-4, 3-5, 4-6, 5-7, 6-8, 7-9, 8-10, 9-11, 10-12, 11-13, 12-14, 13-15, 14-16, 15-17, 16-18, 17-19, or 18-20 polyethylene glycol moieties per protein molecule. Methods for determining the degree of substitution are discussed, for example, in Delgado et al., Crit. Rev. Thera. Drug Carrier Sys. 9:249-304 (1992).

[0223] The reproductive system associated polypeptides of the invention can be recovered and purified from chemical synthesis and recombinant cell cultures by standard methods which include, but are not limited to, ammonium sulfate or ethanol precipitation, acid extraction, anion or cation exchange chromatography, phosphocellulose chromatography, hydrophobic interaction chromatography, affinity chromatography, hydroxylapatite chromatography and lectin chromatography. Most preferably, high performance liquid chromatography ("HPLC") is employed for purification. Well known techniques for refolding protein may be employed to regenerate active conformation when the polypeptide is denatured during isolation and/or purification.

[0224] Reproductive system associated polynucleotides and polypeptides may be used in accordance with the present invention for a variety of applications, particularly those that make use of the chemical and biological properties of reproductive system associated antigens. Among these are applications in the detection, prevention, diagnosis and/or treatment of diseases associated with the reproductive system, such as e.g., cancers of the reproductive system, tumors, injuries and trauma, infections,

congenital defects, and diseases or disorders which result in infertility, complications with pregnancy, labor, or parturition, postpartum difficulties, and as listed below in the section entitled "Reproductive System Disorders". Additional applications relate to diagnosis and to treatment of disorders of cells, tissues and organisms. These aspects of the invention are discussed further below.

[0225] In a preferred embodiment, polynucleotides expressed in a particular tissue type (see, e.g., Table 1A, column 7) are used to detect, diagnose, treat, prevent and/or prognose disorders associated with the tissue type.

[0226] The polypeptides of the invention may be in monomers or multimers (i.e., dimers, trimers, tetramers and higher multimers). Accordingly, the present invention relates to monomers and multimers of the polypeptides of the invention, their preparation, and compositions (preferably, Therapeutics) containing them. In specific embodiments, the polypeptides of the invention are monomers, dimers, trimers or tetramers. In additional embodiments, the multimers of the invention are at least dimers, at least trimers, or at least tetramers.

[0227] Multimers encompassed by the invention may be homomers or heteromers. As used herein, the term homomer refers to a multimer containing only polypeptides corresponding to a protein of the invention (e.g., the amino acid sequence of SEQ ID NO:Y, an amino acid sequence encoded by SEQ ID NO:X or the complement of SEQ ID NO:X, the amino acid sequence encoded by the portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2, and/or an amino acid sequence encoded by cDNA contained in Clone ID NO:Z (including fragments, variants, splice variants, and fusion proteins, corresponding to these as described herein)). These homomers may contain polypeptides having identical or different amino acid sequences. In a specific embodiment, a homomer of the invention is a multimer containing only polypeptides having an identical amino acid sequence. In another specific embodiment, a homomer of the invention is a multimer containing polypeptides having different amino acid sequences. In specific embodiments, the multimer of the invention is a homodimer (e.g., containing two polypeptides having identical or different amino acid sequences) or a homotrimer (e.g., containing three polypeptides having identical and/or different amino acid sequences). In additional embodiments, the homomeric multimer of the invention is at least a homodimer, at least a homotrimer, or at least a homotetramer.

[0228] As used herein, the term heteromer refers to a multimer containing two or more heterologous polypeptides (i.e., polypeptides of different proteins) in addition to the polypeptides of the invention. In a specific embodiment, the multimer of the invention is a heterodimer, a heterotrimer, or a heterotetramer. In additional embodiments, the heteromeric multimer of the invention is at least a heterodimer, at least a heterotrimer, or at least a heterotetramer.

[0229] Multimers of the invention may be the result of hydrophobic, hydrophilic, ionic and/or covalent associations and/or may be indirectly linked by, for example, liposome formation. Thus, in one embodiment, multimers of the invention, such as, for example, homodimers or homotrimers, are formed when polypeptides of the invention contact one another in solution. In another embodiment, heteromultimers of the invention, such as, for example, heterotrimers or heterotetramers, are formed when polypeptides of the invention contact antibodies to the polypeptides of the invention (including antibodies to the heterologous polypeptide sequence in a fusion protein of the invention) in solution. In other embodiments, multimers of the invention are formed by covalent associations with and/or between the polypeptides of the invention. Such covalent associations may involve one or more amino acid residues contained in the polypeptide sequence (e.g., that recited in SEQ ID NO:Y, encoded by the portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2, and/or encoded by the cDNA contained in Clone ID NO:Z). In one instance, the covalent associations are cross-linking between cysteine residues located within the polypeptide sequences which interact in the native (i.e., naturally occurring) polypeptide. In another instance, the covalent associations are the consequence of chemical or recombinant manipulation. Alternatively, such covalent associations may involve one or more amino acid residues contained in the heterologous polypeptide sequence in a fusion protein. In one example, covalent associations are between the heterologous sequence contained in a fusion protein of the invention (see, e.g., U.S. Patent Number 5,478,925). In a specific example, the covalent associations are between the heterologous sequence contained in a Fc fusion protein of the invention (as described herein). In another specific example, covalent associations of fusion proteins of the invention are between heterologous polypeptide sequence from another protein that is capable of forming covalently associated multimers, such as for example,

osteoprotegerin (see, e.g., International Publication NO: WO 98/49305, the contents of which are herein incorporated by reference in its entirety). In another embodiment, two or more polypeptides of the invention are joined through peptide linkers. Examples include those peptide linkers described in U.S. Pat. No. 5,073,627 (hereby incorporated by reference). Proteins comprising multiple polypeptides of the invention separated by peptide linkers may be produced using conventional recombinant DNA technology.

[0230] Another method for preparing multimer polypeptides of the invention involves use of polypeptides of the invention fused to a leucine zipper or isoleucine zipper polypeptide sequence. Leucine zipper and isoleucine zipper domains are polypeptides that promote multimerization of the proteins in which they are found. Leucine zippers were originally identified in several DNA-binding proteins (Landschulz et al., Science 240:1759, (1988)), and have since been found in a variety of different proteins. Among the known leucine zippers are naturally occurring peptides and derivatives thereof that dimerize or trimerize. Examples of leucine zipper domains suitable for producing soluble multimeric proteins of the invention are those described in PCT application WO 94/10308, hereby incorporated by reference. Recombinant fusion proteins comprising a polypeptide of the invention fused to a polypeptide sequence that dimerizes or trimerizes in solution are expressed in suitable host cells, and the resulting soluble multimeric fusion protein is recovered from the culture supernatant using techniques known in the art.

[0231] Trimeric polypeptides of the invention may offer the advantage of enhanced biological activity. Preferred leucine zipper moieties and isoleucine moieties are those that preferentially form trimers. One example is a leucine zipper derived from lung surfactant protein D (SPD), as described in Hoppe et al. (FEBS Letters 344:191, (1994)) and in U.S. patent application Ser. No. 08/446,922, hereby incorporated by reference. Other peptides derived from naturally occurring trimeric proteins may be employed in preparing trimeric polypeptides of the invention.

[0232] In another example, proteins of the invention are associated by interactions between Flag® polypeptide sequence contained in fusion proteins of the invention containing Flag® polypeptide sequence. In a further embodiment, proteins of the

invention are associated by interactions between heterologous polypeptide sequence contained in Flag® fusion proteins of the invention and anti-Flag® antibody.

[0233] The multimers of the invention may be generated using chemical techniques known in the art. For example, polypeptides desired to be contained in the multimers of the invention may be chemically cross-linked using linker molecules and linker molecule length optimization techniques known in the art (see, e.g., U.S. Patent Number 5,478,925, which is herein incorporated by reference in its entirety). Additionally, multimers of the invention may be generated using techniques known in the art to form one or more inter-molecule cross-links between the cysteine residues located within the sequence of the polypeptides desired to be contained in the multimer (see, e.g., U.S. Patent Number 5,478,925, which is herein incorporated by reference in its entirety). Further, polypeptides of the invention may be routinely modified by the addition of cysteine or biotin to the C-terminus or N-terminus of the polypeptide and techniques known in the art may be applied to generate multimers containing one or more of these modified polypeptides (see, e.g., U.S. Patent Number 5,478,925, which is herein incorporated by reference in its entirety). Additionally, techniques known in the art may be applied to generate liposomes containing the polypeptide components desired to be contained in the multimer of the invention (see, e.g., U.S. Patent Number 5,478,925, which is herein incorporated by reference in its entirety).

[0234] Alternatively, multimers of the invention may be generated using genetic engineering techniques known in the art. In one embodiment, polypeptides contained in multimers of the invention are produced recombinantly using fusion protein technology described herein or otherwise known in the art (see, e.g., U.S. Patent Number 5,478,925, which is herein incorporated by reference in its entirety). In a specific embodiment, polynucleotides coding for a homodimer of the invention are generated by ligating a polynucleotide sequence encoding a polypeptide of the invention to a sequence encoding a linker polypeptide and then further to a synthetic polynucleotide encoding the translated product of the polypeptide in the reverse orientation from the original C-terminus to the N-terminus (lacking the leader sequence) (see, e.g., U.S. Patent Number 5,478,925, which is herein incorporated by reference in its entirety). In another embodiment, recombinant techniques described

herein or otherwise known in the art are applied to generate recombinant polypeptides of the invention which contain a transmembrane domain (or hydrophobic or signal peptide) and which can be incorporated by membrane reconstitution techniques into liposomes (see, e.g., U.S. Patent Number 5,478,925, which is herein incorporated by reference in its entirety).

Antibodies

[0235] Further polypeptides of the invention relate to antibodies and T-cell antigen receptors (TCR) which immunospecifically bind a polypeptide, polypeptide fragment, or variant of the invention (e.g., a polypeptide or fragment or variant of the amino acid sequence of SEQ ID NO:Y or a polypeptide encoded by the cDNA contained in Clone ID NO:Z, and/or an epitope, of the present invention) as determined by immunoassays well known in the art for assaying specific antibody-antigen binding. Antibodies of the invention include, but are not limited to, polyclonal, monoclonal, multispecific, human, humanized or chimeric antibodies, single chain antibodies, Fab fragments, F(ab') fragments, fragments produced by a Fab expression library, anti-idiotypic (anti-Id) antibodies (including, e.g., anti-Id antibodies to antibodies of the invention), intracellularly-made antibodies (i.e., intrabodies), and epitope-binding fragments of any of the above. The term "antibody," as used herein, refers to immunoglobulin molecules and immunologically active portions of immunoglobulin molecules, i.e., molecules that contain an antigen binding site that immunospecifically binds an antigen. The immunoglobulin molecules of the invention can be of any type (e.g., IgG, IgE, IgM, IgD, IgA and IgY), class (e.g., IgG1, IgG2, IgG3, IgG4, IgA1 and IgA2) or subclass of immunoglobulin molecule. In preferred embodiments, the immunoglobulin molecules of the invention are IgG1. In other preferred embodiments, the immunoglobulin molecules of the invention are IgG4.

[0236] Most preferably the antibodies are human antigen-binding antibody fragments of the present invention and include, but are not limited to, Fab, Fab' and F(ab')₂, Fd, single-chain Fvs (scFv), single-chain antibodies, disulfide-linked Fvs (sdFv) and fragments comprising either a VL or VH domain. Antigen-binding antibody fragments, including single-chain antibodies, may comprise the variable region(s) alone or in combination with the entirety or a portion of the following: hinge

region, CH1, CH2, and CH3 domains. Also included in the invention are antigen-binding fragments also comprising any combination of variable region(s) with a hinge region, CH1, CH2, and CH3 domains. The antibodies of the invention may be from any animal origin including birds and mammals. Preferably, the antibodies are human, murine (e.g., mouse and rat), donkey, sheep rabbit, goat, guinea pig, camel, horse, or chicken. As used herein, "human" antibodies include antibodies having the amino acid sequence of a human immunoglobulin and include antibodies isolated from human immunoglobulin libraries or from animals transgenic for one or more human immunoglobulin and that do not express endogenous immunoglobulins, as described *infra* and, for example in, U.S. Patent No. 5,939,598 by Kucherlapati et al.

[0237] The antibodies of the present invention may be monospecific, bispecific, trispecific or of greater multispecificity. Multispecific antibodies may be specific for different epitopes of a polypeptide of the present invention or may be specific for both a polypeptide of the present invention as well as for a heterologous epitope, such as a heterologous polypeptide or solid support material. See, e.g., PCT publications WO 93/17715; WO 92/08802; WO 91/00360; WO 92/05793; Tutt, et al., J. Immunol. 147:60-69 (1991); U.S. Patent Nos. 4,474,893; 4,714,681; 4,925,648; 5,573,920; 5,601,819; Kostelny et al., J. Immunol. 148:1547-1553 (1992).

[0238] Antibodies of the present invention may be described or specified in terms of the epitope(s) or portion(s) of a polypeptide of the present invention which they recognize or specifically bind. The epitope(s) or polypeptide portion(s) may be specified as described herein, e.g., by N-terminal and C-terminal positions, or by size in contiguous amino acid residues, or listed in the Tables and Figures. Preferred epitopes of the invention include those shown in column 6 of Table 1A, as well as polynucleotides that encode these epitopes. Antibodies which specifically bind any epitope or polypeptide of the present invention may also be excluded. Therefore, the present invention includes antibodies that specifically bind polypeptides of the present invention, and allows for the exclusion of the same.

[0239] Antibodies of the present invention may also be described or specified in terms of their cross-reactivity. Antibodies that do not bind any other analog, ortholog, or homolog of a polypeptide of the present invention are included. Antibodies that bind polypeptides with at least 95%, at least 90%, at least 85%, at least 80%, at least

75%, at least 70%, at least 65%, at least 60%, at least 55%, and at least 50% identity (as calculated using methods known in the art and described herein) to a polypeptide of the present invention are also included in the present invention. In specific embodiments, antibodies of the present invention cross-react with murine, rat and/or rabbit homologs of human proteins and the corresponding epitopes thereof. Antibodies that do not bind polypeptides with less than 95%, less than 90%, less than 85%, less than 80%, less than 75%, less than 70%, less than 65%, less than 60%, less than 55%, and less than 50% identity (as calculated using methods known in the art and described herein) to a polypeptide of the present invention are also included in the present invention. In a specific embodiment, the above-described cross-reactivity is with respect to any single specific antigenic or immunogenic polypeptide, or combination(s) of 2, 3, 4, 5, or more of the specific antigenic and/or immunogenic polypeptides disclosed herein. Further included in the present invention are antibodies which bind polypeptides encoded by polynucleotides which hybridize to a polynucleotide of the present invention under stringent hybridization conditions (as described herein). Antibodies of the present invention may also be described or specified in terms of their binding affinity to a polypeptide of the invention. Preferred binding affinities include those with a dissociation constant or K_d less than 5×10^{-2} M, 10^{-2} M, 5×10^{-3} M, 10^{-3} M, 5×10^{-4} M, 10^{-4} M, 5×10^{-5} M, 10^{-5} M, 5×10^{-6} M, 10^{-6} M, 5×10^{-7} M, 10^{-7} M, 5×10^{-8} M, 10^{-8} M, 5×10^{-9} M, 10^{-9} M, 5×10^{-10} M, 10^{-10} M, 5×10^{-11} M, 10^{-11} M, 5×10^{-12} M, 10^{-12} M, 5×10^{-13} M, 10^{-13} M, 5×10^{-14} M, 10^{-14} M, 5×10^{-15} M, or 10^{-15} M.

[0240] The invention also provides antibodies that competitively inhibit binding of an antibody to an epitope of the invention as determined by any method known in the art for determining competitive binding, for example, the immunoassays described herein. In preferred embodiments, the antibody competitively inhibits binding to the epitope by at least 95%, at least 90%, at least 85 %, at least 80%, at least 75%, at least 70%, at least 60%, or at least 50%.

[0241] Antibodies of the present invention may act as agonists or antagonists of the polypeptides of the present invention. For example, the present invention includes antibodies which disrupt the receptor/ligand interactions with the polypeptides of the invention either partially or fully. Preferably, antibodies of the present invention bind

an antigenic epitope disclosed herein, or a portion thereof. The invention features both receptor-specific antibodies and ligand-specific antibodies. The invention also features receptor-specific antibodies which do not prevent ligand binding but prevent receptor activation. Receptor activation (i.e., signaling) may be determined by techniques described herein or otherwise known in the art. For example, receptor activation can be determined by detecting the phosphorylation (e.g., tyrosine or serine/threonine) of the receptor or its substrate by immunoprecipitation followed by western blot analysis (for example, as described *supra*). In specific embodiments, antibodies are provided that inhibit ligand activity or receptor activity by at least 95%, at least 90%, at least 85%, at least 80%, at least 75%, at least 70%, at least 60%, or at least 50% of the activity in absence of the antibody.

[0242] The invention also features receptor-specific antibodies which both prevent ligand binding and receptor activation as well as antibodies that recognize the receptor-ligand complex, and, preferably, do not specifically recognize the unbound receptor or the unbound ligand. Likewise, included in the invention are neutralizing antibodies which bind the ligand and prevent binding of the ligand to the receptor, as well as antibodies which bind the ligand, thereby preventing receptor activation, but do not prevent the ligand from binding the receptor. Further included in the invention are antibodies which activate the receptor. These antibodies may act as receptor agonists, i.e., potentiate or activate either all or a subset of the biological activities of the ligand-mediated receptor activation, for example, by inducing dimerization of the receptor. The antibodies may be specified as agonists, antagonists or inverse agonists for biological activities comprising the specific biological activities of the peptides of the invention disclosed herein. The above antibody agonists can be made using methods known in the art. See, e.g., PCT publication WO 96/40281; U.S. Patent No. 5,811,097; Deng et al., *Blood* 92(6):1981-1988 (1998); Chen et al., *Cancer Res.* 58(16):3668-3678 (1998); Harrop et al., *J. Immunol.* 161(4):1786-1794 (1998); Zhu et al., *Cancer Res.* 58(15):3209-3214 (1998); Yoon et al., *J. Immunol.* 160(7):3170-3179 (1998); Prat et al., *J. Cell. Sci.* 111(Pt2):237-247 (1998); Pitard et al., *J. Immunol. Methods* 205(2):177-190 (1997); Liautard et al., *Cytokine* 9(4):233-241 (1997); Carlson et al., *J. Biol. Chem.* 272(17):11295-11301 (1997); Taryman et al., *Neuron* 14(4):755-762 (1995); Muller et al., *Structure* 6(9):1153-1167 (1998); Bartunek et al.,

Cytokine 8(1):14-20 (1996) (which are all incorporated by reference herein in their entireties).

[0243] Antibodies of the present invention may be used, for example, to purify, detect, and target the polypeptides of the present invention, including both *in vitro* and *in vivo* diagnostic and therapeutic methods. For example, the antibodies have utility in immunoassays for qualitatively and quantitatively measuring levels of the polypeptides of the present invention in biological samples. See, e.g., Harlow et al., *Antibodies: A Laboratory Manual*, (Cold Spring Harbor Laboratory Press, 2nd ed. 1988); incorporated by reference herein in its entirety.

[0244] As discussed in more detail below, the antibodies of the present invention may be used either alone or in combination with other compositions. The antibodies may further be recombinantly fused to a heterologous polypeptide at the N- or C-terminus or chemically conjugated (including covalent and non-covalent conjugations) to polypeptides or other compositions. For example, antibodies of the present invention may be recombinantly fused or conjugated to molecules useful as labels in detection assays and effector molecules such as heterologous polypeptides, drugs, radionuclides, or toxins. See, e.g., PCT publications WO 92/08495; WO 91/14438; WO 89/12624; U.S. Patent No. 5,314,995; and EP 396,387; the disclosures of which are incorporated herein by reference in their entireties.

[0245] The antibodies of the invention include derivatives that are modified, i.e., by the covalent attachment of any type of molecule to the antibody such that covalent attachment does not prevent the antibody from generating an anti-idiotypic response. For example, but not by way of limitation, the antibody derivatives include antibodies that have been modified, e.g., by glycosylation, acetylation, pegylation, phosphorylation, amidation, derivatization by known protecting/blocking groups, proteolytic cleavage, linkage to a cellular ligand or other protein, etc. Any of numerous chemical modifications may be carried out by known techniques, including, but not limited to specific chemical cleavage, acetylation, formylation, metabolic synthesis of tunicamycin, etc. Additionally, the derivative may contain one or more non-classical amino acids.

[0246] The antibodies of the present invention may be generated by any suitable method known in the art. Polyclonal antibodies to an antigen-of-interest can be

produced by various procedures well known in the art. For example, a polypeptide of the invention can be administered to various host animals including, but not limited to, rabbits, mice, rats, etc. to induce the production of sera containing polyclonal antibodies specific for the antigen. Various adjuvants may be used to increase the immunological response, depending on the host species, and include but are not limited to, Freund's (complete and incomplete), mineral gels such as aluminum hydroxide, surface active substances such as lysolecithin, pluronic polyols, polyanions, peptides, oil emulsions, keyhole limpet hemocyanins, dinitrophenol, and potentially useful human adjuvants such as BCG (bacille Calmette-Guerin) and corynebacterium parvum. Such adjuvants are also well known in the art.

[0247] Monoclonal antibodies can be prepared using a wide variety of techniques known in the art including the use of hybridoma, recombinant, and phage display technologies, or a combination thereof. For example, monoclonal antibodies can be produced using hybridoma techniques including those known in the art and taught, for example, in Harlow et al., *Antibodies: A Laboratory Manual*, (Cold Spring Harbor Laboratory Press, 2nd ed. 1988); Hammerling, et al., in: *Monoclonal Antibodies and T-Cell Hybridomas* 563-681 (Elsevier, N.Y., 1981) (said references incorporated by reference in their entireties). The term "monoclonal antibody" as used herein is not limited to antibodies produced through hybridoma technology. The term "monoclonal antibody" refers to an antibody that is derived from a single clone, including any eukaryotic, prokaryotic, or phage clone, and not the method by which it is produced.

[0248] Methods for producing and screening for specific antibodies using hybridoma technology are routine and well known in the art and are discussed in detail in the Examples. In a non-limiting example, mice can be immunized with a polypeptide of the invention or a cell expressing such peptide. Once an immune response is detected, e.g., antibodies specific for the antigen are detected in the mouse serum, the mouse spleen is harvested and splenocytes isolated. The splenocytes are then fused by well known techniques to any suitable myeloma cells, for example cells from cell line SP20 available from the ATCC. Hybridomas are selected and cloned by limited dilution. The hybridoma clones are then assayed by methods known in the art for cells that secrete antibodies capable of binding a polypeptide of the invention.

Ascites fluid, which generally contains high levels of antibodies, can be generated by immunizing mice with positive hybridoma clones.

[0249] Accordingly, the present invention provides methods of generating monoclonal antibodies as well as antibodies produced by the method comprising culturing a hybridoma cell secreting an antibody of the invention wherein, preferably, the hybridoma is generated by fusing splenocytes isolated from a mouse immunized with an antigen of the invention with myeloma cells and then screening the hybridomas resulting from the fusion for hybridoma clones that secrete an antibody able to bind a polypeptide of the invention.

[0250] Another well known method for producing both polyclonal and monoclonal human B cell lines is transformation using Epstein Barr Virus (EBV). Protocols for generating EBV-transformed B cell lines are commonly known in the art, such as, for example, the protocol outlined in Chapter 7.22 of Current Protocols in Immunology, Coligan et al., Eds., 1994, John Wiley & Sons, NY, which is hereby incorporated in its entirety by reference herein. The source of B cells for transformation is commonly human peripheral blood, but B cells for transformation may also be derived from other sources including, but not limited to, lymph nodes, tonsil, spleen, tumor tissue, and infected tissues. Tissues are generally made into single cell suspensions prior to EBV transformation. Additionally, steps may be taken to either physically remove or inactivate T cells (e.g., by treatment with cyclosporin A) in B cell-containing samples, because T cells from individuals seropositive for anti-EBV antibodies can suppress B cell immortalization by EBV.

[0251] In general, the sample containing human B cells is inoculated with EBV, and cultured for 3-4 weeks. A typical source of EBV is the culture supernatant of the B95-8 cell line (ATCC #VR-1492). Physical signs of EBV transformation can generally be seen towards the end of the 3-4 week culture period. By phase-contrast microscopy, transformed cells may appear large, clear, hairy and tend to aggregate in tight clusters of cells. Initially, EBV lines are generally polyclonal. However, over prolonged periods of cell cultures, EBV lines may become monoclonal or polyclonal as a result of the selective outgrowth of particular B cell clones. Alternatively, polyclonal EBV transformed lines may be subcloned (e.g., by limiting dilution culture) or fused with a suitable fusion partner and plated at limiting dilution to obtain

monoclonal B cell lines. Suitable fusion partners for EBV transformed cell lines include mouse myeloma cell lines (e.g., SP2/0, X63-Ag8.653), heteromyeloma cell lines (human x mouse; e.g., SPAM-8, SBC-H20, and CB-F7), and human cell lines (e.g., GM 1500, SKO-007, RPMI 8226, and KR-4). Thus, the present invention also provides a method of generating polyclonal or monoclonal human antibodies against polypeptides of the invention or fragments thereof, comprising EBV-transformation of human B cells.

[0252] Antibody fragments which recognize specific epitopes may be generated by known techniques. For example, Fab and F(ab')₂ fragments of the invention may be produced by proteolytic cleavage of immunoglobulin molecules, using enzymes such as papain (to produce Fab fragments) or pepsin (to produce F(ab')₂ fragments). F(ab')₂ fragments contain the variable region, the light chain constant region and the CH1 domain of the heavy chain. For example, the antibodies of the present invention can also be generated using various phage display methods known in the art and as discussed in detail in the Examples (e.g., Example 10). In phage display methods, functional antibody domains are displayed on the surface of phage particles which carry the polynucleotide sequences encoding them. In a particular embodiment, such phage can be utilized to display antigen binding domains expressed from a repertoire or combinatorial antibody library (e.g., human or murine). Phage expressing an antigen binding domain that binds the antigen of interest can be selected or identified with antigen, e.g., using labeled antigen or antigen bound or captured to a solid surface or bead. Phage used in these methods are typically filamentous phage including fd and M13 binding domains expressed from phage with Fab, Fv or disulfide stabilized Fv antibody domains recombinantly fused to either the phage gene III or gene VIII protein. Examples of phage display methods that can be used to make the antibodies of the present invention include those disclosed in Brinkman et al., J. Immunol. Methods 182:41-50 (1995); Ames et al., J. Immunol. Methods 184:177-186 (1995); Kettleborough et al., Eur. J. Immunol. 24:952-958 (1994); Persic et al., Gene 187 9-18 (1997); Burton et al., Advances in Immunology 57:191-280 (1994); PCT application No. PCT/GB91/01134; PCT publications WO 90/02809; WO 91/10737; WO 92/01047; WO 92/18619; WO 93/11236; WO 95/15982; WO 95/20401; and U.S. Patent Nos. 5,698,426; 5,223,409; 5,403,484; 5,580,717; 5,427,908; 5,750,753;

5,821,047; 5,571,698; 5,427,908; 5,516,637; 5,780,225; 5,658,727; 5,733,743 and 5,969,108; each of which is incorporated herein by reference in its entirety.

[0253] As described in the above references, after phage selection, the antibody coding regions from the phage can be isolated and used to generate whole antibodies, including human antibodies, or any other desired antigen binding fragment, and expressed in any desired host, including mammalian cells, insect cells, plant cells, yeast, and bacteria, e.g., as described in detail below. For example, techniques to recombinantly produce Fab, Fab' and F(ab')₂ fragments can also be employed using methods known in the art such as those disclosed in PCT publication WO 92/22324; Mullinax et al., BioTechniques 12(6):864-869 (1992); and Sawai et al., AJRI 34:26-34 (1995); and Better et al., Science 240:1041-1043 (1988) (said references incorporated by reference in their entireties).

[0254] Examples of techniques which can be used to produce single-chain Fvs and antibodies include those described in U.S. Patents 4,946,778 and 5,258,498; Huston et al., Methods in Enzymology 203:46-88 (1991); Shu et al., PNAS 90:7995-7999 (1993); and Skerra et al., Science 240:1038-1040 (1988). For some uses, including *in vivo* use of antibodies in humans and *in vitro* detection assays, it may be preferable to use chimeric, humanized, or human antibodies. A chimeric antibody is a molecule in which different portions of the antibody are derived from different animal species, such as antibodies having a variable region derived from a murine monoclonal antibody and a human immunoglobulin constant region. Methods for producing chimeric antibodies are known in the art. See e.g., Morrison, Science 229:1202 (1985); Oi et al., BioTechniques 4:214 (1986); Gillies et al., (1989) J. Immunol. Methods 125:191-202; U.S. Patent Nos. 5,807,715; 4,816,567; and 4,816,397, which are incorporated herein by reference in their entirety. Humanized antibodies are antibody molecules from non-human species antibody that binds the desired antigen having one or more complementarity determining regions (CDRs) from the non-human species and a framework regions from a human immunoglobulin molecule. Often, framework residues in the human framework regions will be substituted with the corresponding residue from the CDR donor antibody to alter, preferably improve, antigen binding. These framework substitutions are identified by methods well known in the art, e.g., by modeling of the interactions of the CDR and framework

residues to identify framework residues important for antigen binding and sequence comparison to identify unusual framework residues at particular positions. (See, e.g., Queen et al., U.S. Patent No. 5,585,089; Riechmann et al., Nature 332:323 (1988), which are incorporated herein by reference in their entireties.) Antibodies can be humanized using a variety of techniques known in the art including, for example, CDR-grafting (EP 239,400; PCT publication WO 91/09967; U.S. Patent Nos. 5,225,539; 5,530,101; and 5,585,089), veneering or resurfacing (EP 592,106; EP 519,596; Padlan, Molecular Immunology 28(4/5):489-498 (1991); Studnicka et al., Protein Engineering 7(6):805-814 (1994); Roguska et al., PNAS 91:969-973 (1994)), and chain shuffling (U.S. Patent No. 5,565,332).

[0255] Completely human antibodies are particularly desirable for therapeutic treatment of human patients. Human antibodies can be made by a variety of methods known in the art including phage display methods described above using antibody libraries derived from human immunoglobulin sequences. See also, U.S. Patent Nos. 4,444,887 and 4,716,111; and PCT publications WO 98/46645, WO 98/50433, WO 98/24893, WO 98/16654, WO 96/34096, WO 96/33735, and WO 91/10741; each of which is incorporated herein by reference in its entirety.

[0256] Human antibodies can also be produced using transgenic mice which are incapable of expressing functional endogenous immunoglobulins, but which can express human immunoglobulin genes. For example, the human heavy and light chain immunoglobulin gene complexes may be introduced randomly or by homologous recombination into mouse embryonic stem cells. Alternatively, the human variable region, constant region, and diversity region may be introduced into mouse embryonic stem cells in addition to the human heavy and light chain genes. The mouse heavy and light chain immunoglobulin genes may be rendered non-functional separately or simultaneously with the introduction of human immunoglobulin loci by homologous recombination. In particular, homozygous deletion of the JH region prevents endogenous antibody production. The modified embryonic stem cells are expanded and microinjected into blastocysts to produce chimeric mice. The chimeric mice are then bred to produce homozygous offspring which express human antibodies. The transgenic mice are immunized in the normal fashion with a selected antigen, e.g., all or a portion of a polypeptide of the invention. Monoclonal antibodies directed against

the antigen can be obtained from the immunized, transgenic mice using conventional hybridoma technology. The human immunoglobulin transgenes harbored by the transgenic mice rearrange during B cell differentiation, and subsequently undergo class switching and somatic mutation. Thus, using such a technique, it is possible to produce therapeutically useful IgG, IgA, IgM and IgE antibodies. For an overview of this technology for producing human antibodies, see Lonberg and Huszar, *Int. Rev. Immunol.* 13:65-93 (1995). For a detailed discussion of this technology for producing human antibodies and human monoclonal antibodies and protocols for producing such antibodies, see, e.g., PCT publications WO 98/24893; WO 92/01047; WO 96/34096; WO 96/33735; European Patent No. 0 598 877; U.S. Patent Nos. 5,413,923; 5,625,126; 5,633,425; 5,569,825; 5,661,016; 5,545,806; 5,814,318; 5,885,793; 5,916,771; 5,939,598; 6,075,181 and 6,114,598, which are incorporated by reference herein in their entirety. In addition, companies such as Abgenix, Inc. (Freemont, CA) and Genpharm (San Jose, CA) can be engaged to provide human antibodies directed against a selected antigen using technology similar to that described above.

[0257] Completely human antibodies which recognize a selected epitope can be generated using a technique referred to as "guided selection." In this approach a selected non-human monoclonal antibody, e.g., a mouse antibody, is used to guide the selection of a completely human antibody recognizing the same epitope. (Jespers et al., *Bio/technology* 12:899-903 (1988)).

[0258] Further, antibodies to the polypeptides of the invention can, in turn, be utilized to generate anti-idiotypic antibodies that "mimic" polypeptides of the invention using techniques well known to those skilled in the art. (See, e.g., Greenspan & Bona, *FASEB J.* 7(5):437-444; (1989) and Nissinoff, J. *Immunol.* 147(8):2429-2438 (1991)). For example, antibodies which bind to and competitively inhibit polypeptide multimerization and/or binding of a polypeptide of the invention to a ligand can be used to generate anti-idiotypes that "mimic" the polypeptide multimerization and/or binding domain and, as a consequence, bind to and neutralize polypeptide and/or its ligand. Such neutralizing anti-idiotypes or Fab fragments of such anti-idiotypes can be used in therapeutic regimens to neutralize polypeptide ligand/receptor. For example, such anti-idiotypic antibodies can be used to bind a polypeptide of the invention and/or to bind its ligand(s)/receptor(s), and thereby block its biological activity.

Alternatively, antibodies which bind to and enhance polypeptide multimerization and/or binding, and/or receptor/ligand multimerization, binding and/or signaling can be used to generate anti-idiotypes that function as agonists of a polypeptide of the invention and/or its ligand/receptor. Such agonistic anti-idiotypes or Fab fragments of such anti-idiotypes can be used in therapeutic regimens as agonists of the polypeptides of the invention or its ligand(s)/receptor(s). For example, such anti-idiotypic antibodies can be used to bind a polypeptide of the invention and/or to bind its ligand(s)/receptor(s), and thereby promote or enhance its biological activity.

[0259] Intrabodies of the invention can be produced using methods known in the art, such as those disclosed and reviewed in Chen et al., *Hum. Gene Ther.* 5:595-601 (1994); Marasco, W.A., *Gene Ther.* 4:11-15 (1997); Rondon and Marasco, *Annu. Rev. Microbiol.* 51:257-283 (1997); Proba et al., *J. Mol. Biol.* 275:245-253 (1998); Cohen et al., *Oncogene* 17:2445-2456 (1998); Ohage and Steipe, *J. Mol. Biol.* 291:1119-1128 (1999); Ohage et al., *J. Mol. Biol.* 291:1129-1134 (1999); Wirtz and Steipe, *Protein Sci.* 8:2245-2250 (1999); Zhu et al., *J. Immunol. Methods* 231:207-222 (1999); and references cited therein.

Polynucleotides Encoding Antibodies

[0260] The invention further provides polynucleotides comprising a nucleotide sequence encoding an antibody of the invention and fragments thereof. The invention also encompasses polynucleotides that hybridize under stringent or alternatively, under lower stringency hybridization conditions, e.g., as defined *supra*, to polynucleotides that encode an antibody, preferably, that specifically binds to a polypeptide of the invention, preferably, an antibody that binds to a polypeptide having the amino acid sequence of SEQ ID NO:Y, to a polypeptide encoded by a portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2, and/or to a polypeptide encoded by the cDNA contained in Clone ID NO:Z.

[0261] The polynucleotides may be obtained, and the nucleotide sequence of the polynucleotides determined, by any method known in the art. For example, if the nucleotide sequence of the antibody is known, a polynucleotide encoding the antibody may be assembled from chemically synthesized oligonucleotides (e.g., as described in Kutmeier et al., *BioTechniques* 17:242 (1994)), which, briefly, involves the synthesis

of overlapping oligonucleotides containing portions of the sequence encoding the antibody, annealing and ligating of those oligonucleotides, and then amplification of the ligated oligonucleotides by PCR.

[0262] Alternatively, a polynucleotide encoding an antibody may be generated from nucleic acid from a suitable source. If a clone containing a nucleic acid encoding a particular antibody is not available, but the sequence of the antibody molecule is known, a nucleic acid encoding the immunoglobulin may be chemically synthesized or obtained from a suitable source (e.g., an antibody cDNA library, or a cDNA library generated from, or nucleic acid, preferably poly A+ RNA, isolated from, any tissue or cells expressing the antibody, such as hybridoma cells selected to express an antibody of the invention) by PCR amplification using synthetic primers hybridizable to the 3' and 5' ends of the sequence or by cloning using an oligonucleotide probe specific for the particular gene sequence to identify, e.g., a cDNA clone from a cDNA library that encodes the antibody. Amplified nucleic acids generated by PCR may then be cloned into replicable cloning vectors using any method well known in the art.

[0263] Once the nucleotide sequence and corresponding amino acid sequence of the antibody is determined, the nucleotide sequence of the antibody may be manipulated using methods well known in the art for the manipulation of nucleotide sequences, e.g., recombinant DNA techniques, site directed mutagenesis, PCR, etc. (see, for example, the techniques described in Sambrook et al., 1990, Molecular Cloning, A Laboratory Manual, 2d Ed., Cold Spring Harbor Laboratory, Cold Spring Harbor, NY and Ausubel et al., eds., 1998, Current Protocols in Molecular Biology, John Wiley & Sons, NY, which are both incorporated by reference herein in their entireties), to generate antibodies having a different amino acid sequence, for example to create amino acid substitutions, deletions, and/or insertions.

[0264] In a specific embodiment, the amino acid sequence of the heavy and/or light chain variable domains may be inspected to identify the sequences of the complementarity determining regions (CDRs) by methods that are well known in the art, e.g., by comparison to known amino acid sequences of other heavy and light chain variable regions to determine the regions of sequence hypervariability. Using routine recombinant DNA techniques, one or more of the CDRs may be inserted within framework regions, e.g., into human framework regions to humanize a non-human

antibody, as described *supra*. The framework regions may be naturally occurring or consensus framework regions, and preferably human framework regions (see, e.g., Chothia et al., J. Mol. Biol. 278: 457-479 (1998) for a listing of human framework regions). Preferably, the polynucleotide generated by the combination of the framework regions and CDRs encodes an antibody that specifically binds a polypeptide of the invention. Preferably, as discussed *supra*, one or more amino acid substitutions may be made within the framework regions, and, preferably, the amino acid substitutions improve binding of the antibody to its antigen. Additionally, such methods may be used to make amino acid substitutions or deletions of one or more variable region cysteine residues participating in an intrachain disulfide bond to generate antibody molecules lacking one or more intrachain disulfide bonds. Other alterations to the polynucleotide are encompassed by the present invention and within the skill of the art.

[0265] In addition, techniques developed for the production of "chimeric antibodies" (Morrison et al., Proc. Natl. Acad. Sci. 81:851-855 (1984); Neuberger et al., Nature 312:604-608 (1984); Takeda et al., Nature 314:452-454 (1985)) by splicing genes from a mouse antibody molecule of appropriate antigen specificity together with genes from a human antibody molecule of appropriate biological activity can be used. As described *supra*, a chimeric antibody is a molecule in which different portions are derived from different animal species, such as those having a variable region derived from a murine mAb and a human immunoglobulin constant region, e.g., humanized antibodies.

[0266] Alternatively, techniques described for the production of single chain antibodies (U.S. Patent No. 4,946,778; Bird, Science 242:423-42 (1988); Huston et al., Proc. Natl. Acad. Sci. USA 85:5879-5883 (1988); and Ward et al., Nature 334:544-54 (1989)) can be adapted to produce single chain antibodies. Single chain antibodies are formed by linking the heavy and light chain fragments of the Fv region via an amino acid bridge, resulting in a single chain polypeptide. Techniques for the assembly of functional Fv fragments in *E. coli* may also be used (Skerra et al., Science 242:1038-1041 (1988)).

[0267] The antibodies of the invention can be produced by any method known in the art for the synthesis of antibodies, in particular, by chemical synthesis or preferably, by recombinant expression techniques. Methods of producing antibodies include, but are not limited to, hybridoma technology, EBV transformation, and other methods discussed herein as well as through the use recombinant DNA technology, as discussed below.

[0268] Recombinant expression of an antibody of the invention, or fragment, derivative or analog thereof, (e.g., a heavy or light chain of an antibody of the invention or a single chain antibody of the invention), requires construction of an expression vector containing a polynucleotide that encodes the antibody. Once a polynucleotide encoding an antibody molecule or a heavy or light chain of an antibody, or portion thereof (preferably containing the heavy or light chain variable domain), of the invention has been obtained, the vector for the production of the antibody molecule may be produced by recombinant DNA technology using techniques well known in the art. Thus, methods for preparing a protein by expressing a polynucleotide containing an antibody encoding nucleotide sequence are described herein. Methods which are well known to those skilled in the art can be used to construct expression vectors containing antibody coding sequences and appropriate transcriptional and translational control signals. These methods include, for example, *in vitro* recombinant DNA techniques, synthetic techniques, and *in vivo* genetic recombination. The invention, thus, provides replicable vectors comprising a nucleotide sequence encoding an antibody molecule of the invention, or a heavy or light chain thereof, or a heavy or light chain variable domain, operably linked to a promoter. Such vectors may include the nucleotide sequence encoding the constant region of the antibody molecule (see, e.g., PCT Publication WO 86/05807; PCT Publication WO 89/01036; and U.S. Patent No. 5,122,464) and the variable domain of the antibody may be cloned into such a vector for expression of the entire heavy or light chain.

[0269] The expression vector is transferred to a host cell by conventional techniques and the transfected cells are then cultured by conventional techniques to produce an antibody of the invention. Thus, the invention includes host cells containing a polynucleotide encoding an antibody of the invention, or a heavy or light

chain thereof, or a single chain antibody of the invention, operably linked to a heterologous promoter. In preferred embodiments for the expression of double-chained antibodies, vectors encoding both the heavy and light chains may be co-expressed in the host cell for expression of the entire immunoglobulin molecule, as detailed below.

[0270] A variety of host-expression vector systems may be utilized to express the antibody molecules of the invention. Such host-expression systems represent vehicles by which the coding sequences of interest may be produced and subsequently purified, but also represent cells which may, when transformed or transfected with the appropriate nucleotide coding sequences, express an antibody molecule of the invention in situ. These include but are not limited to microorganisms such as bacteria (e.g., *E. coli*, *B. subtilis*) transformed with recombinant bacteriophage DNA, plasmid DNA or cosmid DNA expression vectors containing antibody coding sequences; yeast (e.g., *Saccharomyces*, *Pichia*) transformed with recombinant yeast expression vectors containing antibody coding sequences; insect cell systems infected with recombinant virus expression vectors (e.g., baculovirus) containing antibody coding sequences; plant cell systems infected with recombinant virus expression vectors (e.g., cauliflower mosaic virus, CaMV; tobacco mosaic virus, TMV) or transformed with recombinant plasmid expression vectors (e.g., Ti plasmid) containing antibody coding sequences; or mammalian cell systems (e.g., COS, CHO, BHK, 293, 3T3 cells) harboring recombinant expression constructs containing promoters derived from the genome of mammalian cells (e.g., metallothionein promoter) or from mammalian viruses (e.g., the adenovirus late promoter; the vaccinia virus 7.5K promoter). Preferably, bacterial cells such as *Escherichia coli*, and more preferably, eukaryotic cells, especially for the expression of whole recombinant antibody molecule, are used for the expression of a recombinant antibody molecule. For example, mammalian cells such as Chinese hamster ovary cells (CHO), in conjunction with a vector such as the major intermediate early gene promoter element from human cytomegalovirus is an effective expression system for antibodies (Foecking et al., *Gene* 45:101 (1986); Cockett et al., *Bio/Technology* 8:2 (1990)).

[0271] In bacterial systems, a number of expression vectors may be advantageously selected depending upon the use intended for the antibody molecule

being expressed. For example, when a large quantity of such a protein is to be produced, for the generation of pharmaceutical compositions of an antibody molecule, vectors which direct the expression of high levels of fusion protein products that are readily purified may be desirable. Such vectors include, but are not limited, to the *E. coli* expression vector pUR278 (Ruther et al., EMBO J. 2:1791 (1983)), in which the antibody coding sequence may be ligated individually into the vector in frame with the lac Z coding region so that a fusion protein is produced; pIN vectors (Inouye & Inouye, Nucleic Acids Res. 13:3101-3109 (1985); Van Heeke & Schuster, J. Biol. Chem. 24:5503-5509 (1989)); and the like. pGEX vectors may also be used to express foreign polypeptides as fusion proteins with glutathione S-transferase (GST). In general, such fusion proteins are soluble and can easily be purified from lysed cells by adsorption and binding to matrix glutathione-agarose beads followed by elution in the presence of free glutathione. The pGEX vectors are designed to include thrombin or factor Xa protease cleavage sites so that the cloned target gene product can be released from the GST moiety.

[0272] In an insect system, *Autographa californica* nuclear polyhedrosis virus (AcNPV) is used as a vector to express foreign genes. The virus grows in *Spodoptera frugiperda* cells. The antibody coding sequence may be cloned individually into non-essential regions (for example the polyhedrin gene) of the virus and placed under control of an AcNPV promoter (for example the polyhedrin promoter).

[0273] In mammalian host cells, a number of viral-based expression systems may be utilized. In cases where an adenovirus is used as an expression vector, the antibody coding sequence of interest may be ligated to an adenovirus transcription/translation control complex, e.g., the late promoter and tripartite leader sequence. This chimeric gene may then be inserted in the adenovirus genome by *in vitro* or *in vivo* recombination. Insertion in a non-essential region of the viral genome (e.g., region E1 or E3) will result in a recombinant virus that is viable and capable of expressing the antibody molecule in infected hosts. (e.g., see Logan & Shenk, Proc. Natl. Acad. Sci. USA 81:355-359 (1984)). Specific initiation signals may also be required for efficient translation of inserted antibody coding sequences. These signals include the ATG initiation codon and adjacent sequences. Furthermore, the initiation codon must be in phase with the reading frame of the desired coding sequence to

ensure translation of the entire insert. These exogenous translational control signals and initiation codons can be of a variety of origins, both natural and synthetic. The efficiency of expression may be enhanced by the inclusion of appropriate transcription enhancer elements, transcription terminators, etc. (see Bittner et al., *Methods in Enzymol.* 153:51-544 (1987)).

[0274] In addition, a host cell strain may be chosen which modulates the expression of the inserted sequences, or modifies and processes the gene product in the specific fashion desired. Such modifications (e.g., glycosylation) and processing (e.g., cleavage) of protein products may be important for the function of the protein. Different host cells have characteristic and specific mechanisms for the post-translational processing and modification of proteins and gene products. Appropriate cell lines or host systems can be chosen to ensure the correct modification and processing of the foreign protein expressed. To this end, eukaryotic host cells which possess the cellular machinery for proper processing of the primary transcript, glycosylation, and phosphorylation of the gene product may be used. Such mammalian host cells include but are not limited to CHO, VERO, BHK, HeLa, COS, MDCK, 293, 3T3, WI38, and in particular, breast cancer cell lines such as, for example, BT483, Hs578T, HTB2, BT20 and T47D, and normal mammary gland cell line such as, for example, CRL7030 and Hs578Bst.

[0275] For long-term, high-yield production of recombinant proteins, stable expression is preferred. For example, cell lines which stably express the antibody molecule may be engineered. Rather than using expression vectors which contain viral origins of replication, host cells can be transformed with DNA controlled by appropriate expression control elements (e.g., promoter, enhancer, sequences, transcription terminators, polyadenylation sites, etc.), and a selectable marker. Following the introduction of the foreign DNA, engineered cells may be allowed to grow for 1-2 days in an enriched media, and then are switched to a selective media. The selectable marker in the recombinant plasmid confers resistance to the selection and allows cells to stably integrate the plasmid into their chromosomes and grow to form foci which in turn can be cloned and expanded into cell lines. This method may advantageously be used to engineer cell lines which express the antibody molecule.

Such engineered cell lines may be particularly useful in screening and evaluation of compounds that interact directly or indirectly with the antibody molecule.

[0276] A number of selection systems may be used, including but not limited to the herpes simplex virus thymidine kinase (Wigler et al., *Cell* 11:223 (1977)), hypoxanthine-guanine phosphoribosyltransferase (Szybalska & Szybalski, *Proc. Natl. Acad. Sci. USA* 48:202 (1992)), and adenine phosphoribosyltransferase (Lowy et al., *Cell* 22:817 (1980)) genes can be employed in tk-, hgp^rt- or ap^rt- cells, respectively. Also, antimetabolite resistance can be used as the basis of selection for the following genes: dhfr, which confers resistance to methotrexate (Wigler et al., *Natl. Acad. Sci. USA* 77:357 (1980); O'Hare et al., *Proc. Natl. Acad. Sci. USA* 78:1527 (1981)); gpt, which confers resistance to mycophenolic acid (Mulligan & Berg, *Proc. Natl. Acad. Sci. USA* 78:2072 (1981)); neo, which confers resistance to the aminoglycoside G-418 (*Clinical Pharmacy* 12:488-505; Wu and Wu, *Biotherapy* 3:87-95 (1991); Tolstoshev, *Ann. Rev. Pharmacol. Toxicol.* 32:573-596 (1993); Mulligan, *Science* 260:926-932 (1993); and Morgan and Anderson, *Ann. Rev. Biochem.* 62:191-217 (1993); TIB TECH 11(5):155-215 (1993)); and hyg^r, which confers resistance to hygromycin (Santerre et al., *Gene* 30:147 (1984)). Methods commonly known in the art of recombinant DNA technology may be routinely applied to select the desired recombinant clone, and such methods are described, for example, in Ausubel et al. (eds.), *Current Protocols in Molecular Biology*, John Wiley & Sons, NY (1993); Kriegler, *Gene Transfer and Expression, A Laboratory Manual*, Stockton Press, NY (1990); and in Chapters 12 and 13, Dracopoli et al. (eds), *Current Protocols in Human Genetics*, John Wiley & Sons, NY (1994); Colberre-Garapin et al., *J. Mol. Biol.* 150:1 (1981), which are incorporated by reference herein in their entireties.

[0277] The expression levels of an antibody molecule can be increased by vector amplification (for a review, see Bebbington and Hentschel, *The use of vectors based on gene amplification for the expression of cloned genes in mammalian cells in DNA cloning*, Vol.3. (Academic Press, New York, 1987)). When a marker in the vector system expressing antibody is amplifiable, increase in the level of inhibitor present in culture of host cell will increase the number of copies of the marker gene. Since the amplified region is associated with the antibody gene, production of the antibody will also increase (Crouse et al., *Mol. Cell. Biol.* 3:257 (1983)).

[0278] Vectors which use glutamine synthase (GS) or DHFR as the selectable markers can be amplified in the presence of the drugs methionine sulfoximine or methotrexate, respectively. An advantage of glutamine synthase based vectors are the availability of cell lines (e.g., the murine myeloma cell line, NS0) which are glutamine synthase negative. Glutamine synthase expression systems can also function in glutamine synthase expressing cells (e.g., Chinese Hamster Ovary (CHO) cells) by providing additional inhibitor to prevent the functioning of the endogenous gene. A glutamine synthase expression system and components thereof are detailed in PCT publications: WO87/04462; WO86/05807; WO89/01036; WO89/10404; and WO91/06657 which are incorporated in their entireties by reference herein. Additionally, glutamine synthase expression vectors that may be used according to the present invention are commercially available from suppliers, including, for example Lonza Biologics, Inc. (Portsmouth, NH). Expression and production of monoclonal antibodies using a GS expression system in murine myeloma cells is described in Bebbington et al., *Bio/technology* 10:169(1992) and in Biblia and Robinson *Biotechnol. Prog.* 11:1 (1995) which are incorporated in their entireties by reference herein.

[0279] The host cell may be co-transfected with two expression vectors of the invention, the first vector encoding a heavy chain derived polypeptide and the second vector encoding a light chain derived polypeptide. The two vectors may contain identical selectable markers which enable equal expression of heavy and light chain polypeptides. Alternatively, a single vector may be used which encodes, and is capable of expressing, both heavy and light chain polypeptides. In such situations, the light chain should be placed before the heavy chain to avoid an excess of toxic free heavy chain (Proudfoot, *Nature* 322:52 (1986); Kohler, *Proc. Natl. Acad. Sci. USA* 77:2197 (1980)). The coding sequences for the heavy and light chains may comprise cDNA or genomic DNA.

[0280] Once an antibody molecule of the invention has been produced by an animal, chemically synthesized, or recombinantly expressed, it may be purified by any method known in the art for purification of an immunoglobulin molecule, for example, by chromatography (e.g., ion exchange, affinity, particularly by affinity for the specific antigen after Protein A, and sizing column chromatography), centrifugation,

differential solubility, or by any other standard technique for the purification of proteins. In addition, the antibodies of the present invention or fragments thereof can be fused to heterologous polypeptide sequences described herein or otherwise known in the art, to facilitate purification.

[0281] The present invention encompasses antibodies recombinantly fused or chemically conjugated (including both covalently and non-covalently conjugations) to a polypeptide (or portion thereof, preferably at least 10, 20, 30, 40, 50, 60, 70, 80, 90 or 100 amino acids of the polypeptide) of the present invention to generate fusion proteins. The fusion does not necessarily need to be direct, but may occur through linker sequences. The antibodies may be specific for antigens other than polypeptides (or portion thereof, preferably at least 10, 20, 30, 40, 50, 60, 70, 80, 90 or 100 amino acids of the polypeptide) of the present invention. For example, antibodies may be used to target the polypeptides of the present invention to particular cell types, either *in vitro* or *in vivo*, by fusing or conjugating the polypeptides of the present invention to antibodies specific for particular cell surface receptors. Antibodies fused or conjugated to the polypeptides of the present invention may also be used in *in vitro* immunoassays and purification methods using methods known in the art. See e.g., Harbor et al., *supra*, and PCT publication WO 93/21232; EP 439,095; Naramura et al., Immunol. Lett. 39:91-99 (1994); U.S. Patent 5,474,981; Gillies et al., PNAS 89:1428-1432 (1992); Fell et al., J. Immunol. 146:2446-2452 (1991), which are incorporated by reference in their entireties.

[0282] The present invention further includes compositions comprising the polypeptides of the present invention fused or conjugated to antibody domains other than the variable regions. For example, the polypeptides of the present invention may be fused or conjugated to an antibody Fc region, or portion thereof. The antibody portion fused to a polypeptide of the present invention may comprise the constant region, hinge region, CH1 domain, CH2 domain, and CH3 domain or any combination of whole domains or portions thereof. The polypeptides may also be fused or conjugated to the above antibody portions to form multimers. For example, Fc portions fused to the polypeptides of the present invention can form dimers through disulfide bonding between the Fc portions. Higher multimeric forms can be made by fusing the polypeptides to portions of IgA and IgM. Methods for fusing or

conjugating the polypeptides of the present invention to antibody portions are known in the art. See, e.g., U.S. Patent Nos. 5,336,603; 5,622,929; 5,359,046; 5,349,053; 5,447,851; 5,112,946; EP 307,434; EP 367,166; PCT publications WO 96/04388; WO 91/06570; Ashkenazi et al., Proc. Natl. Acad. Sci. USA 88:10535-10539 (1991); Zheng et al., J. Immunol. 154:5590-5600 (1995); and Vil et al., Proc. Natl. Acad. Sci. USA 89:11337- 11341 (1992) (said references incorporated by reference in their entireties).

[0283] As discussed, *supra*, the polypeptides corresponding to a polypeptide, polypeptide fragment, or a variant of SEQ ID NO:Y may be fused or conjugated to the above antibody portions to increase the *in vivo* half life of the polypeptides or for use in immunoassays using methods known in the art. Further, the polypeptides corresponding to SEQ ID NO:Y may be fused or conjugated to the above antibody portions to facilitate purification. One reported example describes chimeric proteins consisting of the first two domains of the human CD4-polypeptide and various domains of the constant regions of the heavy or light chains of mammalian immunoglobulins. See EP 394,827; Traunecker et al., Nature 331:84-86 (1988). The polypeptides of the present invention fused or conjugated to an antibody having disulfide-linked dimeric structures (due to the IgG) may also be more efficient in binding and neutralizing other molecules, than the monomeric secreted protein or protein fragment alone. See, for example, Fountoulakis et al., J. Biochem. 270:3958-3964 (1995). In many cases, the Fc part in a fusion protein is beneficial in therapy and diagnosis, and thus can result in, for example, improved pharmacokinetic properties. See, for example, EP A 232,262. Alternatively, deleting the Fc part after the fusion protein has been expressed, detected, and purified, would be desired. For example, the Fc portion may hinder therapy and diagnosis if the fusion protein is used as an antigen for immunizations. In drug discovery, for example, human proteins, such as hIL-5, have been fused with Fc portions for the purpose of high-throughput screening assays to identify antagonists of hIL-5. (See, Bennett et al., J. Molecular Recognition 8:52-58 (1995); Johanson et al., J. Biol. Chem. 270:9459-9471 (1995)).

[0284] Moreover, the antibodies or fragments thereof of the present invention can be fused to marker sequences, such as a peptide to facilitate purification. In preferred embodiments, the marker amino acid sequence is a hexa-histidine peptide, such as the

tag provided in a pQE vector (QIAGEN, Inc., 9259 Eton Avenue, Chatsworth, CA, 91311), among others, many of which are commercially available. As described in Gentz et al., Proc. Natl. Acad. Sci. USA 86:821-824 (1989), for instance, hexahistidine provides for convenient purification of the fusion protein. Other peptide tags useful for purification include, but are not limited to, the "HA" tag, which corresponds to an epitope derived from the influenza hemagglutinin protein (Wilson et al., Cell 37:767 (1984)) and the "flag" tag.

[0285] The present invention further encompasses antibodies or fragments thereof conjugated to a diagnostic or therapeutic agent. The antibodies can be used diagnostically to, for example, monitor the development or progression of a tumor as part of a clinical testing procedure to, e.g., determine the efficacy of a given treatment regimen. Detection can be facilitated by coupling the antibody to a detectable substance. Examples of detectable substances include various enzymes, prosthetic groups, fluorescent materials, luminescent materials, bioluminescent materials, radioactive materials, positron emitting metals using various positron emission tomographies, and nonradioactive paramagnetic metal ions. The detectable substance may be coupled or conjugated either directly to the antibody (or fragment thereof) or indirectly, through an intermediate (such as, for example, a linker known in the art) using techniques known in the art. See, for example, U.S. Patent No. 4,741,900 for metal ions which can be conjugated to antibodies for use as diagnostics according to the present invention.

[0286] Further, an antibody or fragment thereof may be conjugated to a therapeutic moiety such as a cytotoxin, e.g., a cytostatic or cytocidal agent, a therapeutic agent or a radioactive metal ion, e.g., alpha-emitters such as, for example, ^{213}Bi . A cytotoxin or cytotoxic agent includes any agent that is detrimental to cells. Examples include paclitaxol, cytochalasin B, gramicidin D, ethidium bromide, emetine, mitomycin, etoposide, teniposide, vincristine, vinblastine, colchicin, doxorubicin, daunorubicin, dihydroxy anthracin dione, mitoxantrone, mithramycin, actinomycin D, 1-dehydrotestosterone, glucocorticoids, procaine, tetracaine, lidocaine, propranolol, and puromycin and analogs or homologs thereof. Therapeutic agents include, but are not limited to, antimetabolites (e.g., methotrexate, 6-mercaptopurine, 6-thioguanine, cytarabine, 5-fluorouracil decarbazine), alkylating

agents (e.g., mechlorethamine, thioepa chlorambucil, melphalan, carmustine (BSNU) and lomustine (CCNU), cyclophosphamide, busulfan, dibromomannitol, streptozotocin, mitomycin C, and cis- dichlorodiamine platinum (II) (DDP) cisplatin), anthracyclines (e.g., daunorubicin (formerly daunomycin) and doxorubicin), antibiotics (e.g., dactinomycin (formerly actinomycin), bleomycin, mithramycin, and anthramycin (AMC)), and anti-mitotic agents (e.g., vincristine and vinblastine).

[0287] The conjugates of the invention can be used for modifying a given biological response, the therapeutic agent or drug moiety is not to be construed as limited to classical chemical therapeutic agents. For example, the drug moiety may be a protein or polypeptide possessing a desired biological activity. Such proteins may include, for example, a toxin such as abrin, ricin 'A, pseudomonas exotoxin, or diphtheria toxin; a protein such as tumor necrosis factor, α -interferon, β -interferon, nerve growth factor, platelet derived growth factor, tissue plasminogen activator, an apoptotic agent, e.g., TNF- α , TNF- β , AIM I (See, International Publication No. WO 97/33899), AIM II (See, International Publication No. WO 97/34911), Fas Ligand (Takahashi *et al.*, *Int. Immunol.*, 6:1567-1574 (1994)), VEGI (See, International Publication No. WO 99/23105), a thrombotic agent or an anti- angiogenic agent, e.g., angiostatin or endostatin; or, biological response modifiers such as, for example, lymphokines, interleukin-1 ("IL-1"), interleukin-2 ("IL-2"), interleukin-6 ("IL-6"), granulocyte macrophage colony stimulating factor ("GM-CSF"), granulocyte colony stimulating factor ("G-CSF"), or other growth factors.

[0288] Antibodies may also be attached to solid supports, which are particularly useful for immunoassays or purification of the target antigen. Such solid supports include, but are not limited to, glass, cellulose, polyacrylamide, nylon, polystyrene, polyvinyl chloride or polypropylene.

[0289] Techniques for conjugating such therapeutic moiety to antibodies are well known. See, for example., Arnon *et al.*, "Monoclonal Antibodies For Immunotargeting Of Drugs In Cancer Therapy", in *Monoclonal Antibodies And Cancer Therapy*, Reisfeld *et al.* (eds.), pp. 243-56 (Alan R. Liss, Inc. 1985); Hellstrom *et al.*, "Antibodies For Drug Delivery", in *Controlled Drug Delivery* (2nd Ed.), Robinson *et al.* (eds.), pp. 623-53 (Marcel Dekker, Inc. 1987); Thorpe, "Antibody Carriers Of Cytotoxic Agents In Cancer Therapy: A Review", in *Monoclonal*

Antibodies '84: Biological And Clinical Applications, Pinchera et al. (eds.), pp. 475-506 (1985); "Analysis, Results, And Future Prospective Of The Therapeutic Use Of Radiolabeled Antibody In Cancer Therapy", in Monoclonal Antibodies For Cancer Detection And Therapy, Baldwin et al. (eds.), pp. 303-16 (Academic Press 1985), and Thorpe et al., "The Preparation And Cytotoxic Properties Of Antibody-Toxin Conjugates", Immunol. Rev. 62:119-58 (1982).

[0290] Alternatively, an antibody can be conjugated to a second antibody to form an antibody heteroconjugate as described by Segal in U.S. Patent No. 4,676,980, which is incorporated herein by reference in its entirety.

[0291] An antibody, with or without a therapeutic moiety conjugated to it, administered alone or in combination with cytotoxic factor(s) and/or cytokine(s) can be used as a therapeutic.

Immunophenotyping

[0292] The antibodies of the invention may be utilized for immunophenotyping of cell lines and biological samples. Translation products of the genes of the present invention may be useful as cell specific markers, or more specifically as cellular markers that are differentially expressed at various stages of differentiation and/or maturation of particular cell types. Monoclonal antibodies directed against a specific epitope, or combination of epitopes, will allow for the screening of cellular populations expressing the marker. Various techniques can be utilized using monoclonal antibodies to screen for cellular populations expressing the marker(s), and include magnetic separation using antibody-coated magnetic beads, "panning" with antibody attached to a solid matrix (i.e., plate), and flow cytometry (See, e.g., U.S. Patent 5,985,660; and Morrison et al., Cell, 96:737-49 (1999)).

[0293] These techniques allow for the screening of particular populations of cells, such as might be found with hematological malignancies (i.e. minimal residual disease (MRD) in acute leukemic patients) and "non-self" cells in transplantations to prevent Graft-versus-Host Disease (GVHD). Alternatively, these techniques allow for the screening of hematopoietic stem and progenitor cells capable of undergoing proliferation and/or differentiation, as might be found in human umbilical cord blood.

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nylon, blocking the membrane in blocking solution (e.g., PBS with 3% BSA or non-fat milk), washing the membrane in washing buffer (e.g., PBS-Tween 20), blocking the membrane with primary antibody (the antibody of interest) diluted in blocking buffer, washing the membrane in washing buffer, blocking the membrane with a secondary antibody (which recognizes the primary antibody, e.g., an anti-human antibody) conjugated to an enzymatic substrate (e.g., horseradish peroxidase or alkaline phosphatase) or radioactive molecule (e.g., ^{32}P or ^{125}I) diluted in blocking buffer, washing the membrane in wash buffer, and detecting the presence of the antigen. One of skill in the art would be knowledgeable as to the parameters that can be modified to increase the signal detected and to reduce the background noise. For further discussion regarding western blot protocols see, e.g., Ausubel et al., eds., (1994), Current Protocols in Molecular Biology, Vol. 1, John Wiley & Sons, Inc., New York, section 10.8.1.

[0297] ELISAs comprise preparing antigen, coating the well of a 96 well microtiter plate with the antigen, adding the antibody of interest conjugated to a detectable compound such as an enzymatic substrate (e.g., horseradish peroxidase or alkaline phosphatase) to the well and incubating for a period of time, and detecting the presence of the antigen. In ELISAs the antibody of interest does not have to be conjugated to a detectable compound; instead, a second antibody (which recognizes the antibody of interest) conjugated to a detectable compound may be added to the well. Further, instead of coating the well with the antigen, the antibody may be coated to the well. In this case, a second antibody conjugated to a detectable compound may be added following the addition of the antigen of interest to the coated well. One of skill in the art would be knowledgeable as to the parameters that can be modified to increase the signal detected as well as other variations of ELISAs known in the art. For further discussion regarding ELISAs see, e.g., Ausubel et al., eds., (1994), Current Protocols in Molecular Biology, Vol. 1, John Wiley & Sons, Inc., New York, section 11.2.1.

[0298] The binding affinity of an antibody to an antigen and the off-rate of an antibody-antigen interaction can be determined by competitive binding assays. One example of a competitive binding assay is a radioimmunoassay comprising the incubation of labeled antigen (e.g., ^3H or ^{125}I) with the antibody of interest in the

presence of increasing amounts of unlabeled antigen, and the detection of the antibody bound to the labeled antigen. The affinity of the antibody of interest for a particular antigen and the binding off-rates can be determined from the data by scatchard plot analysis. Competition with a second antibody can also be determined using radioimmunoassays. In this case, the antigen is incubated with antibody of interest conjugated to a labeled compound (e.g., 3H or 125I) in the presence of increasing amounts of an unlabeled second antibody.

[0299] Antibodies of the invention may be characterized using immunocytochemistry methods on cells (e.g., mammalian cells, such as CHO cells) transfected with a vector enabling the expression of a reproductive system antigen or with vector alone using techniques commonly known in the art. Antibodies that bind reproductive system antigen transfected cells, but not vector-only transfected cells, are reproductive system antigen specific.

Therapeutic Uses

[0300] The present invention is further directed to antibody-based therapies which involve administering antibodies of the invention to an animal, preferably a mammal, and most preferably a human, patient for treating one or more of the disclosed diseases, disorders, or conditions. Therapeutic compounds of the invention include, but are not limited to, antibodies of the invention (including fragments, analogs and derivatives thereof as described herein) and nucleic acids encoding antibodies of the invention (including fragments, analogs and derivatives thereof and anti-idiotypic antibodies as described herein). The antibodies of the invention can be used to treat, inhibit or prevent diseases, disorders or conditions associated with aberrant expression and/or activity of a polypeptide of the invention, including, but not limited to, any one or more of the diseases, disorders, or conditions described herein. The treatment and/or prevention of diseases, disorders, or conditions associated with aberrant expression and/or activity of a polypeptide of the invention includes, but is not limited to, alleviating symptoms associated with those diseases, disorders or conditions. Antibodies of the invention may be provided in pharmaceutically acceptable compositions as known in the art or as described herein.

[0301] In a specific and preferred embodiment, the present invention is directed to antibody-based therapies which involve administering antibodies of the invention to an animal, preferably a mammal, and most preferably a human, patient for treating one or more of the diseases, disorders, or conditions of the reproductive system, including, but not limited to, injuries and trauma, infections, neoplastic disorders, congenital defects, and diseases or disorders which result in infertility, complications with pregnancy, labor, or parturition, postpartum difficulties, and as listed below in the section entitled "Reproductive System Disorders". Therapeutic compounds of the invention include, but are not limited to, antibodies of the invention (e.g., antibodies directed to the full length protein expressed on the cell surface of a mammalian cell; antibodies directed to an epitope of a reproductive system associated polypeptide of the invention (such as, a linear epitope (shown in Table 1A, column 6) or a conformational epitope), including fragments, analogs and derivatives thereof as described herein) and nucleic acids encoding antibodies of the invention (including fragments, analogs and derivatives thereof and anti-idiotypic antibodies as described herein). The antibodies of the invention can be used to treat, inhibit or prevent diseases, disorders or conditions associated with aberrant expression and/or activity of a polypeptide of the invention, including, but not limited to, any one or more of the diseases, disorders, or conditions of the reproductive system described herein. The treatment and/or prevention of diseases, disorders, or conditions of the reproductive system associated with aberrant expression and/or activity of a polypeptide of the invention includes, but is not limited to, alleviating symptoms associated with those diseases, disorders or conditions. Antibodies of the invention may be provided in pharmaceutically acceptable compositions as known in the art or as described herein.

[0302] A summary of the ways in which the antibodies of the present invention may be used therapeutically includes binding polynucleotides or polypeptides of the present invention locally or systemically in the body or by direct cytotoxicity of the antibody, e.g. as mediated by complement (CDC) or by effector cells (ADCC). Some of these approaches are described in more detail below. Armed with the teachings provided herein, one of ordinary skill in the art will know how to use the antibodies of the present invention for diagnostic, monitoring or therapeutic purposes without undue experimentation.

[0303] The antibodies of this invention may be advantageously utilized in combination with other monoclonal or chimeric antibodies, or with lymphokines or hematopoietic growth factors (such as, e.g., IL-2, IL-3 and IL-7), for example, which serve to increase the number or activity of effector cells which interact with the antibodies.

[0304] The antibodies of the invention may be administered alone or in combination with other types of treatments (e.g., radiation therapy, chemotherapy, hormonal therapy, immunotherapy and anti-tumor agents). Generally, administration of products of a species origin or species reactivity (in the case of antibodies) that is the same species as that of the patient is preferred. Thus, in a preferred embodiment, human antibodies, fragments derivatives, analogs, or nucleic acids, are administered to a human patient for therapy or prophylaxis.

[0305] It is preferred to use high affinity and/or potent *in vivo* inhibiting and/or neutralizing antibodies against polypeptides or polynucleotides of the present invention, fragments or regions thereof, for both immunoassays directed to and therapy of disorders related to polynucleotides or polypeptides, including fragments thereof, of the present invention. Such antibodies, fragments, or regions, will preferably have an affinity for polynucleotides or polypeptides of the invention, including fragments thereof. Preferred binding affinities include those with a dissociation constant or K_d less than 5×10^{-2} M, 10^{-2} M, 5×10^{-3} M, 10^{-3} M, 5×10^{-4} M, 10^{-4} M, 5×10^{-5} M, 10^{-5} M, 5×10^{-6} M, 10^{-6} M, 5×10^{-7} M, 10^{-7} M, 5×10^{-8} M, 10^{-8} M, 5×10^{-9} M, 10^{-9} M, 5×10^{-10} M, 10^{-10} M, 5×10^{-11} M, 10^{-11} M, 5×10^{-12} M, 10^{-12} M, 5×10^{-13} M, 10^{-13} M, 5×10^{-14} M, 10^{-14} M, 5×10^{-15} M, and 10^{-15} M.

Gene Therapy

[0306] In a specific embodiment, nucleic acids comprising sequences encoding antibodies or functional derivatives thereof, are administered to treat, inhibit or prevent a disease or disorder associated with aberrant expression and/or activity of a polypeptide of the invention, by way of gene therapy. Gene therapy refers to therapy performed by the administration to a subject of an expressed or expressible nucleic acid. In this embodiment of the invention, the nucleic acids produce their encoded protein that mediates a therapeutic effect.

[0307] Any of the methods for gene therapy available in the art can be used according to the present invention. Exemplary methods are described below.

[0308] For general reviews of the methods of gene therapy, see Goldspiel et al., Clinical Pharmacy 12:488-505 (1993); Wu and Wu, Biotherapy 3:87-95 (1991); Tolstoshev, Ann. Rev. Pharmacol. Toxicol. 32:573-596 (1993); Mulligan, Science 260:926-932 (1993); and Morgan and Anderson, Ann. Rev. Biochem. 62:191-217 (1993); May, TIBTECH 11(5):155-215 (1993). Methods commonly known in the art of recombinant DNA technology which can be used are described in Ausubel et al. (eds.), Current Protocols in Molecular Biology, John Wiley & Sons, NY (1993); and Kriegler, Gene Transfer and Expression, A Laboratory Manual, Stockton Press, NY (1990).

[0309] In a preferred embodiment, the compound comprises nucleic acid sequences encoding an antibody, said nucleic acid sequences being part of expression vectors that express the antibody or fragments or chimeric proteins or heavy or light chains thereof in a suitable host. In particular, such nucleic acid sequences have promoters operably linked to the antibody coding region, said promoter being inducible or constitutive, and, optionally, tissue-specific. In another particular embodiment, nucleic acid molecules are used in which the antibody coding sequences and any other desired sequences are flanked by regions that promote homologous recombination at a desired site in the genome, thus providing for intrachromosomal expression of the antibody encoding nucleic acids (Koller and Smithies, Proc. Natl. Acad. Sci. USA 86:8932-8935 (1989); Zijlstra et al., Nature 342:435-438 (1989)). In specific embodiments, the expressed antibody molecule is a single chain antibody; alternatively, the nucleic acid sequences include sequences encoding both the heavy and light chains, or fragments thereof, of the antibody.

[0310] Delivery of the nucleic acids into a patient may be either direct, in which case the patient is directly exposed to the nucleic acid or nucleic acid-carrying vectors, or indirect, in which case, cells are first transformed with the nucleic acids *in vitro*, then transplanted into the patient. These two approaches are known, respectively, as *in vivo* or *ex vivo* gene therapy.

[0311] In a specific embodiment, the nucleic acid sequences are directly administered *in vivo*, where it is expressed to produce the encoded product. This can

be accomplished by any of numerous methods known in the art, e.g., by constructing them as part of an appropriate nucleic acid expression vector and administering it so that they become intracellular, e.g., by infection using defective or attenuated retrovirals or other viral vectors (see U.S. Patent No. 4,980,286), or by direct injection of naked DNA, or by use of microparticle bombardment (e.g., a gene gun; Biolistic, Dupont), or coating with lipids or cell-surface receptors or transfecting agents, encapsulation in liposomes, microparticles, or microcapsules, or by administering them in linkage to a peptide which is known to enter the nucleus, by administering it in linkage to a ligand subject to receptor-mediated endocytosis (see, e.g., Wu and Wu, J. Biol. Chem. 262:4429-4432 (1987)) (which can be used to target cell types specifically expressing the receptors), etc. In another embodiment, nucleic acid-ligand complexes can be formed in which the ligand comprises a fusogenic viral peptide to disrupt endosomes, allowing the nucleic acid to avoid lysosomal degradation. In yet another embodiment, the nucleic acid can be targeted *in vivo* for cell specific uptake and expression, by targeting a specific receptor (see, e.g., PCT Publications WO 92/06180; WO 92/22635; WO92/20316; WO93/14188, WO 93/20221). Alternatively, the nucleic acid can be introduced intracellularly and incorporated within host cell DNA for expression, by homologous recombination (Koller and Smithies, Proc. Natl. Acad. Sci. USA 86:8932-8935 (1989); Zijlstra et al., Nature 342:435-438 (1989)).

[0312] In a specific embodiment, viral vectors that contains nucleic acid sequences encoding an antibody of the invention are used. For example, a retroviral vector can be used (see Miller et al., Meth. Enzymol. 217:581-599 (1993)). These retroviral vectors contain the components necessary for the correct packaging of the viral genome and integration into the host cell DNA. The nucleic acid sequences encoding the antibody to be used in gene therapy are cloned into one or more vectors, which facilitates delivery of the gene into a patient. More detail about retroviral vectors can be found in Boesen et al., Biotherapy 6:291-302 (1994), which describes the use of a retroviral vector to deliver the *mdr1* gene to hematopoietic stem cells in order to make the stem cells more resistant to chemotherapy. Other references illustrating the use of retroviral vectors in gene therapy are: Clowes et al., J. Clin. Invest. 93:644-651 (1994); Kiem et al., Blood 83:1467-1473 (1994); Salmons and Gunzberg, Human

Gene Therapy 4:129-141 (1993); and Grossman and Wilson, Curr. Opin. in Genetics and Devel. 3:110-114 (1993).

[0313] Adenoviruses are other viral vectors that can be used in gene therapy. Adenoviruses are especially attractive vehicles for delivering genes to respiratory epithelia. Adenoviruses naturally infect respiratory epithelia where they cause a mild disease. Other targets for adenovirus-based delivery systems are liver, the central nervous system, endothelial cells, and muscle. Adenoviruses have the advantage of being capable of infecting non-dividing cells. Kozarsky and Wilson, Current Opinion in Genetics and Development 3:499-503 (1993) present a review of adenovirus-based gene therapy. Bout et al., Human Gene Therapy 5:3-10 (1994) demonstrated the use of adenovirus vectors to transfer genes to the respiratory epithelia of rhesus monkeys. Other instances of the use of adenoviruses in gene therapy can be found in Rosenfeld et al., Science 252:431-434 (1991); Rosenfeld et al., Cell 68:143-155 (1992); Mastrangeli et al., J. Clin. Invest. 91:225-234 (1993); PCT Publication WO94/12649; and Wang, et al., Gene Therapy 2:775-783 (1995). In a preferred embodiment, adenovirus vectors are used.

[0314] Adeno-associated virus (AAV) has also been proposed for use in gene therapy (Walsh et al., Proc. Soc. Exp. Biol. Med. 204:289-300 (1993); U.S. Patent No. 5,436,146).

[0315] Another approach to gene therapy involves transferring a gene to cells in tissue culture by such methods as electroporation, lipofection, calcium phosphate mediated transfection, or viral infection. Usually, the method of transfer includes the transfer of a selectable marker to the cells. The cells are then placed under selection to isolate those cells that have taken up and are expressing the transferred gene. Those cells are then delivered to a patient.

[0316] In this embodiment, the nucleic acid is introduced into a cell prior to administration *in vivo* of the resulting recombinant cell. Such introduction can be carried out by any method known in the art, including but not limited to transfection, electroporation, microinjection, infection with a viral or bacteriophage vector containing the nucleic acid sequences, cell fusion, chromosome-mediated gene transfer, microcell-mediated gene transfer, spheroplast fusion, etc. Numerous techniques are known in the art for the introduction of foreign genes into cells (see,

e.g., Loeffler and Behr, Meth. Enzymol. 217:599-618 (1993); Cohen et al., Meth. Enzymol. 217:618-644 (1993); Cline, Pharmac. Ther. 29:69-92m (1985) and may be used in accordance with the present invention, provided that the necessary developmental and physiological functions of the recipient cells are not disrupted. The technique should provide for the stable transfer of the nucleic acid to the cell, so that the nucleic acid is expressible by the cell and preferably heritable and expressible by its cell progeny.

[0317] The resulting recombinant cells can be delivered to a patient by various methods known in the art. Recombinant blood cells (e.g., hematopoietic stem or progenitor cells) are preferably administered intravenously. The amount of cells envisioned for use depends on the desired effect, patient state, etc., and can be determined by one skilled in the art.

[0318] Cells into which a nucleic acid can be introduced for purposes of gene therapy encompass any desired, available cell type, and include but are not limited to epithelial cells, endothelial cells, keratinocytes, fibroblasts, muscle cells, hepatocytes; blood cells such as T lymphocytes, B lymphocytes, monocytes, macrophages, neutrophils, eosinophils, megakaryocytes, granulocytes; various stem or progenitor cells, in particular hematopoietic stem or progenitor cells, e.g., as obtained from bone marrow, umbilical cord blood, peripheral blood, fetal liver, etc.

[0319] In a preferred embodiment, the cell used for gene therapy is autologous to the patient.

[0320] In an embodiment in which recombinant cells are used in gene therapy, nucleic acid sequences encoding an antibody are introduced into the cells such that they are expressible by the cells or their progeny, and the recombinant cells are then administered *in vivo* for therapeutic effect. In a specific embodiment, stem or progenitor cells are used. Any stem and/or progenitor cells which can be isolated and maintained *in vitro* can potentially be used in accordance with this embodiment of the present invention (see e.g. PCT Publication WO 94/08598; Stemple and Anderson, Cell 71:973-985 (1992); Rheinwald, Meth. Cell Bio. 21A:229 (1980); and Pittelkow and Scott, Mayo Clinic Proc. 61:771 (1986)).

[0321] In a specific embodiment, the nucleic acid to be introduced for purposes of gene therapy comprises an inducible promoter operably linked to the coding region,

such that expression of the nucleic acid is controllable by the presence or absence of an appropriate inducer of transcription.

Demonstration of Therapeutic or Prophylactic Activity

[0322] The compounds or pharmaceutical compositions of the invention are preferably tested *in vitro*, and then *in vivo* for the desired therapeutic or prophylactic activity, prior to use in humans. For example, *in vitro* assays to demonstrate the therapeutic or prophylactic utility of a compound or pharmaceutical composition include, the effect of a compound on a cell line or a patient tissue sample. The effect of the compound or composition on the cell line and/or tissue sample can be determined utilizing techniques known to those of skill in the art including, but not limited to, rosette formation assays and cell lysis assays. In accordance with the invention, *in vitro* assays which can be used to determine whether administration of a specific compound is indicated, include *in vitro* cell culture assays in which a patient tissue sample is grown in culture, and exposed to or otherwise administered a compound, and the effect of such compound upon the tissue sample is observed.

Therapeutic/Prophylactic Administration and Composition

[0323] The invention provides methods of treatment, inhibition and prophylaxis by administration to a subject of an effective amount of a compound or pharmaceutical composition of the invention, preferably a polypeptide or antibody of the invention. In a preferred embodiment, the compound is substantially purified (e.g., substantially free from substances that limit its effect or produce undesired side-effects). The subject is preferably an animal, including but not limited to animals such as cows, pigs, horses, chickens, cats, dogs, etc., and is preferably a mammal, and most preferably human.

[0324] Formulations and methods of administration that can be employed when the compound comprises a nucleic acid or an immunoglobulin are described above; additional appropriate formulations and routes of administration can be selected from among those described herein below.

[0325] Various delivery systems are known and can be used to administer a compound of the invention, e.g., encapsulation in liposomes, microparticles,

microcapsules, recombinant cells capable of expressing the compound, receptor-mediated endocytosis (see, e.g., Wu and Wu, J. Biol. Chem. 262:4429-4432 (1987)), construction of a nucleic acid as part of a retroviral or other vector, etc. Methods of introduction include but are not limited to intradermal, intramuscular, intraperitoneal, intravenous, subcutaneous, intranasal, epidural, and oral routes. The compounds or compositions may be administered by any convenient route, for example by infusion or bolus injection, by absorption through epithelial or mucocutaneous linings (e.g., oral mucosa, rectal and intestinal mucosa, etc.) and may be administered together with other biologically active agents. Administration can be systemic or local. In addition, it may be desirable to introduce the pharmaceutical compounds or compositions of the invention into the central nervous system by any suitable route, including intraventricular and intrathecal injection; intraventricular injection may be facilitated by an intraventricular catheter, for example, attached to a reservoir, such as an Ommaya reservoir. Pulmonary administration can also be employed, e.g., by use of an inhaler or nebulizer, and formulation with an aerosolizing agent.

[0326] In a specific embodiment, it may be desirable to administer the pharmaceutical compounds or compositions of the invention locally to the area in need of treatment; this may be achieved by, for example, and not by way of limitation, local infusion during surgery, topical application, e.g., in conjunction with a wound dressing after surgery, by injection, by means of a catheter, by means of a suppository, or by means of an implant, said implant being of a porous, non-porous, or gelatinous material, including membranes, such as sialastic membranes, or fibers. Preferably, when administering a protein, including an antibody, of the invention, care must be taken to use materials to which the protein does not absorb.

[0327] In another embodiment, the compound or composition can be delivered in a vesicle, in particular a liposome (see Langer, Science 249:1527-1533 (1990); Treat et al., in Liposomes in the Therapy of Infectious Disease and Cancer, Lopez-Berestein and Fidler (eds.), Liss, New York, pp. 353- 365 (1989); Lopez-Berestein, *ibid.*, pp. 317-327; see generally *ibid.*)

[0328] In yet another embodiment, the compound or composition can be delivered in a controlled release system. In one embodiment, a pump may be used (see Langer, *supra*; Sefton, CRC Crit. Ref. Biomed. Eng. 14:201 (1987); Buchwald et al., Surgery

88:507 (1980); Saudek et al., N. Engl. J. Med. 321:574 (1989)). In another embodiment, polymeric materials can be used (see Medical Applications of Controlled Release, Langer and Wise (eds.), CRC Press, Boca Raton, Florida (1974); Controlled Drug Bioavailability, Drug Product Design and Performance, Smolen and Ball (eds.), Wiley, New York (1984); Ranger and Peppas, J., Macromol. Sci. Rev. Macromol. Chem. 23:61 (1983); see also Levy et al., Science 228:190 (1985); During et al., Ann. Neurol. 25:351 (1989); Howard et al., J. Neurosurg. 71:105 (1989)). In yet another embodiment, a controlled release system can be placed in proximity of the therapeutic target, e.g., the brain, thus requiring only a fraction of the systemic dose (see, e.g., Goodson, in Medical Applications of Controlled Release, *supra*, vol. 2, pp. 115-138 (1984)).

[0329] Other controlled release systems are discussed in the review by Langer (Science 249:1527-1533 (1990)).

[0330] In a specific embodiment where the compound of the invention is a nucleic acid encoding a protein, the nucleic acid can be administered *in vivo* to promote expression of its encoded protein, by constructing it as part of an appropriate nucleic acid expression vector and administering it so that it becomes intracellular, e.g., by use of a retroviral vector (see U.S. Patent No. 4,980,286), or by direct injection, or by use of microparticle bombardment (e.g., a gene gun; Biolistic, Dupont), or coating with lipids or cell-surface receptors or transfecting agents, or by administering it in linkage to a homeobox-like peptide which is known to enter the nucleus (see e.g., Joliot et al., Proc. Natl. Acad. Sci. USA 88:1864-1868 (1991)), etc. Alternatively, a nucleic acid can be introduced intracellularly and incorporated within host cell DNA for expression, by homologous recombination.

[0331] The present invention also provides pharmaceutical compositions. Such compositions comprise a therapeutically effective amount of a compound, and a pharmaceutically acceptable carrier. In a specific embodiment, the term "pharmaceutically acceptable" means approved by a regulatory agency of the Federal or a state government or listed in the U.S. Pharmacopeia or other generally recognized pharmacopeia for use in animals, and more particularly in humans. The term "carrier" refers to a diluent, adjuvant, excipient, or vehicle with which the therapeutic is administered. Such pharmaceutical carriers can be sterile liquids, such as water and

oils, including those of petroleum, animal, vegetable or synthetic origin, such as peanut oil, soybean oil, mineral oil, sesame oil and the like. Water is a preferred carrier when the pharmaceutical composition is administered intravenously. Saline solutions and aqueous dextrose and glycerol solutions can also be employed as liquid carriers, particularly for injectable solutions. Suitable pharmaceutical excipients include starch, glucose, lactose, sucrose, gelatin, malt, rice, flour, chalk, silica gel, sodium stearate, glycerol monostearate, talc, sodium chloride, dried skim milk, glycerol, propylene, glycol, water, ethanol and the like. The composition, if desired, can also contain minor amounts of wetting or emulsifying agents, or pH buffering agents. These compositions can take the form of solutions, suspensions, emulsion, tablets, pills, capsules, powders, sustained-release formulations and the like. The composition can be formulated as a suppository, with traditional binders and carriers such as triglycerides. Oral formulation can include standard carriers such as pharmaceutical grades of mannitol, lactose, starch, magnesium stearate, sodium saccharine, cellulose, magnesium carbonate, etc. Examples of suitable pharmaceutical carriers are described in "Remington's Pharmaceutical Sciences" by E.W. Martin. Such compositions will contain a therapeutically effective amount of the compound, preferably in purified form, together with a suitable amount of carrier so as to provide the form for proper administration to the patient. The formulation should suit the mode of administration.

[0332] In a preferred embodiment, the composition is formulated in accordance with routine procedures as a pharmaceutical composition adapted for intravenous administration to human beings. Typically, compositions for intravenous administration are solutions in sterile isotonic aqueous buffer. Where necessary, the composition may also include a solubilizing agent and a local anesthetic such as lignocaine to ease pain at the site of the injection. Generally, the ingredients are supplied either separately or mixed together in unit dosage form, for example, as a dry lyophilized powder or water free concentrate in a hermetically sealed container such as an ampoule or sachette indicating the quantity of active agent. Where the composition is to be administered by infusion, it can be dispensed with an infusion bottle containing sterile pharmaceutical grade water or saline. Where the composition

is administered by injection, an ampoule of sterile water for injection or saline can be provided so that the ingredients may be mixed prior to administration.

[0333] The compounds of the invention can be formulated as neutral or salt forms. Pharmaceutically acceptable salts include those formed with anions such as those derived from hydrochloric, phosphoric, acetic, oxalic, tartaric acids, etc., and those formed with cations such as those derived from sodium, potassium, ammonium, calcium, ferric hydroxides, isopropylamine, triethylamine, 2-ethylamino ethanol, histidine, procaine, etc.

[0334] The amount of the compound of the invention which will be effective in the treatment, inhibition and prevention of a disease or disorder associated with aberrant expression and/or activity of a polypeptide of the invention can be determined by standard clinical techniques. In addition, *in vitro* assays may optionally be employed to help identify optimal dosage ranges. The precise dose to be employed in the formulation will also depend on the route of administration, and the seriousness of the disease or disorder, and should be decided according to the judgment of the practitioner and each patient's circumstances. Effective doses may be extrapolated from dose-response curves derived from *in vitro* or animal model test systems.

[0335] For antibodies, the dosage administered to a patient is typically 0.1 mg/kg to 100 mg/kg of the patient's body weight. Preferably, the dosage administered to a patient is between 0.1 mg/kg and 20 mg/kg of the patient's body weight, more preferably 1 mg/kg to 10 mg/kg of the patient's body weight. Generally, human antibodies have a longer half-life within the human body than antibodies from other species due to the immune response to the foreign polypeptides. Thus, lower dosages of human antibodies and less frequent administration is often possible. Further, the dosage and frequency of administration of antibodies of the invention may be reduced by enhancing uptake and tissue penetration (e.g., into the brain) of the antibodies by modifications such as, for example, lipidation.

[0336] The invention also provides a pharmaceutical pack or kit comprising one or more containers filled with one or more of the ingredients of the pharmaceutical compositions of the invention. Optionally associated with such container(s) can be a notice in the form prescribed by a governmental agency regulating the manufacture,

use or sale of pharmaceuticals or biological products, which notice reflects approval by the agency of manufacture, use or sale for human administration.

Diagnosis and Imaging

[0337] Labeled antibodies, and derivatives and analogs thereof, which specifically bind to a polypeptide of interest can be used for diagnostic purposes to detect, diagnose, or monitor diseases, disorders, and/or conditions associated with the aberrant expression and/or activity of a polypeptide of the invention. The invention provides for the detection of aberrant expression of a polypeptide of interest, comprising (a) assaying the expression of the polypeptide of interest in cells or body fluid of an individual using one or more antibodies specific to the polypeptide interest and (b) comparing the level of gene expression with a standard gene expression level, whereby an increase or decrease in the assayed polypeptide gene expression level compared to the standard expression level is indicative of aberrant expression.

[0338] The invention provides a diagnostic assay for diagnosing a reproductive system disorder, comprising (a) assaying the expression of the polypeptide of interest in cells or body fluid of an individual using one or more antibodies specific to the polypeptide interest and (b) comparing the level of gene expression with a standard gene expression level, whereby an increase or decrease in the assayed polypeptide gene expression level compared to the standard expression level is indicative of a particular disorder. With respect to cancer, the presence of a relatively high amount of transcript in biopsied tissue from an individual may indicate a predisposition for the development of the disease, or may provide a means for detecting the disease prior to the appearance of actual clinical symptoms. A more definitive diagnosis of this type may allow health professionals to employ preventative measures or aggressive treatment earlier thereby preventing the development or further progression of the cancer.

[0339] Antibodies of the invention can be used to assay protein levels in a biological sample using classical immunohistological methods known to those of skill in the art (e.g., see Jalkanen et al., J. Cell. Biol. 101:976-985 (1985); Jalkanen et al., J. Cell . Biol. 105:3087-3096 (1987)). Other antibody-based methods useful for detecting protein gene expression include immunoassays, such as the enzyme linked

immunosorbent assay (ELISA) and the radioimmunoassay (RIA). Suitable antibody assay labels are known in the art and include enzyme labels, such as, glucose oxidase; radioisotopes, such as iodine (125I, 121I), carbon (14C), sulfur (35S), tritium (3H), indium (112In), and technetium (99Tc); luminescent labels, such as luminol; and fluorescent labels, such as fluorescein and rhodamine, and biotin.

[0340] One facet of the invention is the detection and diagnosis of a disease or disorder associated with aberrant expression of a polypeptide of interest in an animal, preferably a mammal and most preferably a human. A preferred embodiment of the invention is the detection and diagnosis of a disease or disorder of the reproductive system associated with aberrant expression of a reproductive system antigen in an animal, preferably a mammal and most preferably a human. In one embodiment, diagnosis comprises: a) administering (for example, parenterally, subcutaneously, or intraperitoneally) to a subject an effective amount of a labeled molecule which specifically binds to the polypeptide of interest; b) waiting for a time interval following the administering for permitting the labeled molecule to preferentially concentrate at sites in the subject where the polypeptide is expressed (and for unbound labeled molecule to be cleared to background level); c) determining background level; and d) detecting the labeled molecule in the subject, such that detection of labeled molecule above the background level indicates that the subject has a particular disease or disorder associated with aberrant expression of the polypeptide of interest. Background level can be determined by various methods including, comparing the amount of labeled molecule detected to a standard value previously determined for a particular system.

[0341] It will be understood in the art that the size of the subject and the imaging system used will determine the quantity of imaging moiety needed to produce diagnostic images. In the case of a radioisotope moiety, for a human subject, the quantity of radioactivity injected will normally range from about 5 to 20 millicuries of 99mTc. The labeled antibody or antibody fragment will then preferentially accumulate at the location of cells which contain the specific protein. *In vivo* tumor imaging is described in S.W. Burchiel et al., "Immunopharmacokinetics of Radiolabeled Antibodies and Their Fragments." (Chapter 13 in Tumor Imaging: The

Radiochemical Detection of Cancer, S.W. Burchiel and B. A. Rhodes, eds., Masson Publishing Inc. (1982)).

[0342] Depending on several variables, including the type of label used and the mode of administration, the time interval following the administration for permitting the labeled molecule to preferentially concentrate at sites in the subject and for unbound labeled molecule to be cleared to background level is 6 to 48 hours or 6 to 24 hours or 6 to 12 hours. In another embodiment the time interval following administration is 5 to 20 days or 5 to 10 days.

[0343] In an embodiment, monitoring of the disease or disorder is carried out by repeating the method for diagnosing the disease or disorder, for example, one month after initial diagnosis, six months after initial diagnosis, one year after initial diagnosis, etc.

[0344] Presence of the labeled molecule can be detected in the patient using methods known in the art for *in vivo* scanning. These methods depend upon the type of label used. Skilled artisans will be able to determine the appropriate method for detecting a particular label. Methods and devices that may be used in the diagnostic methods of the invention include, but are not limited to, computed tomography (CT), whole body scan such as position emission tomography (PET), magnetic resonance imaging (MRI), and sonography.

[0345] In a specific embodiment, the molecule is labeled with a radioisotope and is detected in the patient using a radiation responsive surgical instrument (Thurston et al., U.S. Patent No. 5,441,050). In another embodiment, the molecule is labeled with a fluorescent compound and is detected in the patient using a fluorescence responsive scanning instrument. In another embodiment, the molecule is labeled with a positron emitting metal and is detected in the patient using positron emission-tomography. In yet another embodiment, the molecule is labeled with a paramagnetic label and is detected in a patient using magnetic resonance imaging (MRI).

Kits

[0346] The present invention provides kits that can be used in the above methods. In one embodiment, a kit comprises an antibody of the invention, preferably a purified antibody, in one or more containers. In a specific embodiment, the kits of the present

invention contain a substantially isolated polypeptide comprising an epitope which is specifically immunoreactive with an antibody included in the kit. Preferably, the kits of the present invention further comprise a control antibody which does not react with the polypeptide of interest. In another specific embodiment, the kits of the present invention contain a means for detecting the binding of an antibody to a polypeptide of interest (e.g., the antibody may be conjugated to a detectable substrate such as a fluorescent compound, an enzymatic substrate, a radioactive compound or a luminescent compound, or a second antibody which recognizes the first antibody may be conjugated to a detectable substrate).

[0347] In another specific embodiment of the present invention, the kit is a diagnostic kit for use in screening serum containing antibodies specific against proliferative and/or cancerous polynucleotides and polypeptides. Such a kit may include a control antibody that does not react with the polypeptide of interest. Such a kit may include a substantially isolated polypeptide antigen comprising an epitope which is specifically immunoreactive with at least one anti-polypeptide antigen antibody. Further, such a kit includes means for detecting the binding of said antibody to the antigen (e.g., the antibody may be conjugated to a fluorescent compound such as fluorescein or rhodamine which can be detected by flow cytometry). In specific embodiments, the kit may include a recombinantly produced or chemically synthesized polypeptide antigen. The polypeptide antigen of the kit may also be attached to a solid support.

[0348] In a more specific embodiment the detecting means of the above-described kit includes a solid support to which said polypeptide antigen is attached. Such a kit may also include a non-attached reporter-labeled anti-human antibody. In this embodiment, binding of the antibody to the polypeptide antigen can be detected by binding of the said reporter-labeled antibody.

[0349] In an additional embodiment, the invention includes a diagnostic kit for use in screening serum containing antigens of the polypeptide of the invention. The diagnostic kit includes a substantially isolated antibody specifically immunoreactive with polypeptide or polynucleotide antigens, and means for detecting the binding of the polynucleotide or polypeptide antigen to the antibody. In one embodiment, the antibody is attached to a solid support. In a specific embodiment, the antibody may be

a monoclonal antibody. The detecting means of the kit may include a second, labeled monoclonal antibody. Alternatively, or in addition, the detecting means may include a labeled, competing antigen.

[0350] In one diagnostic configuration, test serum is reacted with a solid phase reagent having a surface-bound antigen obtained by the methods of the present invention. After binding with specific antigen antibody to the reagent and removing unbound serum components by washing, the reagent is reacted with reporter-labeled anti-human antibody to bind reporter to the reagent in proportion to the amount of bound anti-antigen antibody on the solid support. The reagent is again washed to remove unbound labeled antibody, and the amount of reporter associated with the reagent is determined. Typically, the reporter is an enzyme which is detected by incubating the solid phase in the presence of a suitable fluorometric, luminescent or colorimetric substrate (Sigma, St. Louis, MO).

[0351] The solid surface reagent in the above assay is prepared by known techniques for attaching protein material to solid support material, such as polymeric beads, dip sticks, 96-well plate or filter material. These attachment methods generally include non-specific adsorption of the protein to the support or covalent attachment of the protein, typically through a free amine group, to a chemically reactive group on the solid support, such as an activated carboxyl, hydroxyl, or aldehyde group. Alternatively, streptavidin coated plates can be used in conjunction with biotinylated antigen(s).

[0352] Thus, the invention provides an assay system or kit for carrying out this diagnostic method. The kit generally includes a support with surface-bound recombinant antigens, and a reporter-labeled anti-human antibody for detecting surface-bound anti-antigen antibody.

Uses of the Polynucleotides

[0353] Each of the polynucleotides identified herein can be used in numerous ways as reagents. The following description should be considered exemplary and utilizes known techniques.

[0354] The polynucleotides of the present invention are useful for chromosome identification. There exists an ongoing need to identify new chromosome markers, since few chromosome marking reagents, based on actual sequence data (repeat polymorphisms), are presently available. Each sequence is specifically targeted to and can hybridize with a particular location on an individual human chromosome, thus each polynucleotide of the present invention can routinely be used as a chromosome marker using techniques known in the art. Table 1A, column 8 provides the chromosome location of some of the polynucleotides of the invention.

[0355] Briefly, sequences can be mapped to chromosomes by preparing PCR primers (preferably at least 15 bp (e.g., 15-25 bp) from the sequences shown in SEQ ID NO:X. Primers can optionally be selected using computer analysis so that primers do not span more than one predicted exon in the genomic DNA. These primers are then used for PCR screening of somatic cell hybrids containing individual human chromosomes. Only those hybrids containing the human gene corresponding to SEQ ID NO:X will yield an amplified fragment.

[0356] Similarly, somatic hybrids provide a rapid method of PCR mapping the polynucleotides to particular chromosomes. Three or more clones can be assigned per day using a single thermal cycler. Moreover, sublocalization of the polynucleotides can be achieved with panels of specific chromosome fragments. Other gene mapping strategies that can be used include in situ hybridization, prescreening with labeled flow-sorted chromosomes, preselection by hybridization to construct chromosome specific-cDNA libraries, and computer mapping techniques (See, e.g., Shuler, Trends Biotechnol 16:456-459 (1998) which is hereby incorporated by reference in its entirety).

[0357] Precise chromosomal location of the polynucleotides can also be achieved using fluorescence in situ hybridization (FISH) of a metaphase chromosomal spread. This technique uses polynucleotides as short as 500 or 600 bases; however, polynucleotides 2,000-4,000 bp are preferred. For a review of this technique, see Verma et al., "Human Chromosomes: a Manual of Basic Techniques," Pergamon Press, New York (1988).

[0358] For chromosome mapping, the polynucleotides can be used individually (to mark a single chromosome or a single site on that chromosome) or in panels (for marking multiple sites and/or multiple chromosomes).

[0359] Thus, the present invention also provides a method for chromosomal localization which involves (a) preparing PCR primers from the polynucleotide sequences in Table 1A and/or Table 2 and SEQ ID NO:X and (b) screening somatic cell hybrids containing individual chromosomes.

[0360] The polynucleotides of the present invention would likewise be useful for radiation hybrid mapping, HAPPY mapping, and long range restriction mapping. For a review of these techniques and others known in the art, see, e.g. Dear, "Genome Mapping: A Practical Approach," IRL Press at Oxford University Press, London (1997); Aydin, J. Mol. Med. 77:691-694 (1999); Hacia et al., Mol. Psychiatry 3:483-492 (1998); Herrick et al., Chromosome Res. 7:409-423 (1999); Hamilton et al., Methods Cell Biol. 62:265-280 (2000); and/or Ott, J. Hered. 90:68-70 (1999), each of which is hereby incorporated by reference in its entirety.

[0361] Once a polynucleotide has been mapped to a precise chromosomal location, the physical position of the polynucleotide can be used in linkage analysis. Linkage analysis establishes coinheritance between a chromosomal location and presentation of a particular disease. (Disease mapping data are found, for example, in V. McKusick, Mendelian Inheritance in Man (available on line through Johns Hopkins University Welch Medical Library).) Column 9 of Table 1A provides an OMIM reference identification number of diseases associated with the cytologic band disclosed in column 8 of Table 1A, as determined using techniques described herein and by reference to Table 5. Assuming 1 megabase mapping resolution and one gene per 20 kb, a cDNA precisely localized to a chromosomal region associated with the disease could be one of 50-500 potential causative genes.

[0362] Thus, once coinheritance is established, differences in a polynucleotide of the invention and the corresponding gene between affected and unaffected individuals can be examined. First, visible structural alterations in the chromosomes, such as deletions or translocations, are examined in chromosome spreads or by PCR. If no structural alterations exist, the presence of point mutations are ascertained. Mutations observed in some or all affected individuals, but not in normal individuals, indicates

that mutations may cause the disease. However, complete sequencing of the polypeptide and the corresponding gene from several normal individuals is required to distinguish the mutation from a polymorphism. If a new polymorphism is identified, this polymorphic polypeptide can be used for further linkage analysis.

[0363] Furthermore, increased or decreased expression of the gene in affected individuals as compared to unaffected individuals can be assessed using the polynucleotides of the invention. Any of these alterations (altered expression, chromosomal rearrangement, or mutation) can be used as a diagnostic or prognostic marker. Diagnostic and prognostic methods, kits and reagents encompassed by the present invention are briefly described below and more thoroughly elsewhere herein (see e.g., the sections labeled "Antibodies", "Diagnostic Assays", and "Methods for Detecting Reproductive System Disease, Including Cancer").

[0364] Thus, the invention also provides a diagnostic method useful during diagnosis of a disorder, involving measuring the expression level of polynucleotides of the present invention in cells or body fluid from an individual and comparing the measured gene expression level with a standard level of polynucleotide expression level, whereby an increase or decrease in the gene expression level compared to the standard is indicative of a disorder. Additional non-limiting examples of diagnostic methods encompassed by the present invention are more thoroughly described elsewhere herein (see, e.g., Example 12).

[0365] In still another embodiment, the invention includes a kit for analyzing samples for the presence of proliferative and/or cancerous polynucleotides derived from a test subject, as further described herein. In a general embodiment, the kit includes at least one polynucleotide probe containing a nucleotide sequence that will specifically hybridize with a polynucleotide of the invention and a suitable container. In a specific embodiment, the kit includes two polynucleotide probes defining an internal region of the polynucleotide of the invention, where each probe has one strand containing a 31'-mer-end internal to the region. In a further embodiment, the probes may be useful as primers for polymerase chain reaction amplification.

[0366] Where a diagnosis of a related disorder, including, for example, diagnosis of a tumor, has already been made according to conventional methods, the present invention is useful as a prognostic indicator, whereby patients exhibiting enhanced or

depressed polynucleotide of the invention expression will experience a worse clinical outcome relative to patients expressing the gene at a level nearer the standard level.

[0367] By "measuring the expression level of polynucleotides of the invention" is intended qualitatively or quantitatively measuring or estimating the level of the polypeptide of the invention or the level of the mRNA encoding the polypeptide of the invention in a first biological sample either directly (e.g., by determining or estimating absolute protein level or mRNA level) or relatively (e.g., by comparing to the polypeptide level or mRNA level in a second biological sample). Preferably, the polypeptide level or mRNA level in the first biological sample is measured or estimated and compared to a standard polypeptide level or mRNA level, the standard being taken from a second biological sample obtained from an individual not having the related disorder or being determined by averaging levels from a population of individuals not having a related disorder. As will be appreciated in the art, once a standard polypeptide level or mRNA level is known, it can be used repeatedly as a standard for comparison.

[0368] By "biological sample" is intended any biological sample obtained from an individual, body fluid, cell line, tissue culture, or other source which contains polypeptide of the present invention or the corresponding mRNA. As indicated, biological samples include body fluids (such as semen, lymph, vaginal pool, sera, plasma, urine, synovial fluid and spinal fluid) which contain the polypeptide of the present invention, and tissue sources found to express the polypeptide of the present invention. Methods for obtaining tissue biopsies and body fluids from mammals are well known in the art. Where the biological sample is to include mRNA, a tissue biopsy is the preferred source.

[0369] The method(s) provided above may preferably be applied in a diagnostic method and/or kits in which polynucleotides and/or polypeptides of the invention are attached to a solid support. In one exemplary method, the support may be a "gene chip" or a "biological chip" as described in U.S. Patents 5,837,832, 5,874,219, and 5,856,174. Further, such a gene chip with polynucleotides of the invention attached may be used to identify polymorphisms between the isolated polynucleotide sequences of the invention, with polynucleotides isolated from a test subject. The knowledge of such polymorphisms (i.e., their location, as well as, their existence) would be

beneficial in identifying disease loci for many disorders, such as for example, in neural disorders, immune system disorders, muscular disorders, reproductive disorders, gastrointestinal disorders, pulmonary disorders, digestive disorders, cardiovascular disorders, renal disorders, proliferative disorders, and/or cancerous diseases and conditions. Such a method is described in U.S. Patents 5,858,659 and 5,856,104. The U.S. Patents referenced *supra* are hereby incorporated by reference in their entirety herein.

[0370] The present invention encompasses polynucleotides of the present invention that are chemically synthesized, or reproduced as peptide nucleic acids (PNA), or according to other methods known in the art. The use of PNAs would serve as the preferred form if the polynucleotides of the invention are incorporated onto a solid support, or gene chip. For the purposes of the present invention, a peptide nucleic acid (PNA) is a polyamide type of DNA analog and the monomeric units for adenine, guanine, thymine and cytosine are available commercially (Perceptive Biosystems). Certain components of DNA, such as phosphorus, phosphorus oxides, or deoxyribose derivatives, are not present in PNAs. As disclosed by Nielsen et al., Science 254:1497 (1991); and Egholm et al., Nature 365:666 (1993), PNAs bind specifically and tightly to complementary DNA strands and are not degraded by nucleases. In fact, PNA binds more strongly to DNA than DNA itself does. This is probably because there is no electrostatic repulsion between the two strands, and also the polyamide backbone is more flexible. Because of this, PNA/DNA duplexes bind under a wider range of stringency conditions than DNA/DNA duplexes; making it easier to perform multiplex hybridization. Smaller probes can be used than with DNA due to the strong binding. In addition, it is more likely that single base mismatches can be determined with PNA/DNA hybridization because a single mismatch in a PNA/DNA 15-mer lowers the melting point ($T_{sub.m}$) by 8°-20° C, vs. 4°-16° C for the DNA/DNA 15-mer duplex. Also, the absence of charge groups in PNA means that hybridization can be done at low ionic strengths and reduce possible interference by salt during the analysis.

[0371] The compounds of the present invention have uses which include, but are not limited to, detecting cancer in mammals. In particular the invention is useful during diagnosis of pathological cell proliferative neoplasias which include, but are not limited to: acute myelogenous leukemias including acute monocytic leukemia,

acute myeloblastic leukemia, acute promyelocytic leukemia, acute myelomonocytic leukemia, acute erythroleukemia, acute megakaryocytic leukemia, and acute undifferentiated leukemia, etc.; and chronic myelogenous leukemias including chronic myelomonocytic leukemia, chronic granulocytic leukemia, etc. Preferred mammals include monkeys, apes, cats, dogs, cows, pigs, horses, rabbits and humans. Particularly preferred are humans.

[0372] The compounds of the present invention have preferred uses which include, but are not limited to, detecting reproductive system cancers in mammals. In particular the invention is useful during diagnosis of pathological cell proliferative neoplasias which include, but are not limited to: testicular cancers (including, for example, teratocarcinoma, embryonal cell carcinoma, yolk sac tumors, Leydig cell tumors, and as listed below in the section entitled "Reproductive System Disorders"), prostate cancers (e.g., adenocarcinomas, transitional cell carcinomas, ductal carcinomas, squamous cell carcinomas, and as listed below in the section entitled "Reproductive System Disorders"), penile cancers (such as squamous cell carcinoma, verrucous carcinoma, penile urethral carcinoma, and as listed below in the section entitled "Reproductive System Disorders"), cancers of the vagina and vulva (including, for example, basal cell carcinoma, melanomas, cancer of Bartholin's gland, and as listed below in the section entitled "Reproductive System Disorders"), uterine cancers (such as adenocarcinomas, leiomyosarcomas, and as listed below in the section entitled "Reproductive System Disorders"), ovarian cancers (e.g., Sertoli-Leydig tumors, endometrioid carcinoma of the ovary, ovarian papillary serous adenocarcinoma, ovarian Krukenberg tumors, and as listed below in the section entitled "Reproductive System Disorders"), and cancers of the cervix (including, for example, squamous metaplasia, columnar cell neoplasia, squamous cell carcinoma, and as listed below in the section entitled "Reproductive System Disorders"). Preferred mammals include monkeys, apes, cats, dogs, cows, pigs, horses, rabbits and humans. Particularly preferred are humans.

[0373] Pathological cell proliferative disorders are often associated with inappropriate activation of proto-oncogenes. (Germann, E. P. et al., "The Etiology of Acute Leukemia: Molecular Genetics and Viral Oncology," in Neoplastic Diseases of the Blood, Vol 1., Wiernik, P. H. et al. eds., 161-182 (1985)). Neoplasias are now

believed to result from the qualitative alteration of a normal cellular gene product, or from the quantitative modification of gene expression by insertion into the chromosome of a viral sequence, by chromosomal translocation of a gene to a more actively transcribed region, or by some other mechanism. (Gelman et al., *supra*) It is likely that mutated or altered expression of specific genes is involved in the pathogenesis of some leukemias, among other tissues and cell types. (Gelman et al., *supra*) Indeed, the human counterparts of the oncogenes involved in some animal neoplasias have been amplified or translocated in some cases of human leukemia and carcinoma. (Gelman et al., *supra*)

[0374] For example, c-myc expression is highly amplified in the non-lymphocytic leukemia cell line HL-60. When HL-60 cells are chemically induced to stop proliferation, the level of c-myc is found to be downregulated. (International Publication Number WO 91/15580). However, it has been shown that exposure of HL-60 cells to a DNA construct that is complementary to the 5' end of c-myc or c-myb blocks translation of the corresponding mRNAs which downregulates expression of the c-myc or c-myb proteins and causes arrest of cell proliferation and differentiation of the treated cells. (International Publication Number WO 91/15580; Wickstrom et al., Proc. Natl. Acad. Sci. 85:1028 (1988); Anfossi et al., Proc. Natl. Acad. Sci. 86:3379 (1989)). However, the skilled artisan would appreciate the present invention's usefulness is not be limited to treatment, prevention, diagnosis and/or prognosis, of proliferative disorders of cells and tissues of hematopoietic origin, in light of the numerous cells and cell types of varying origins which are known to exhibit proliferative phenotypes. In preferred embodiments, the compounds and/or methods of the invention are used to treat, prevent, diagnose, and/or prognose, proliferative disorders of reproductive system cells and tissues.

[0375] In addition to the foregoing, a polynucleotide of the present invention can be used to control gene expression through triple helix formation or through antisense DNA or RNA. Antisense techniques are discussed, for example, in Okano, J. Neurochem. 56: 560 (1991); "Oligodeoxynucleotides as Antisense Inhibitors of Gene Expression, CRC Press, Boca Raton, FL (1988). Triple helix formation is discussed in, for instance Lee et al., Nucleic Acids Research 6: 3073 (1979); Cooney et al., Science 241: 456 (1988); and Dervan et al., Science 251: 1360 (1991). Both methods rely on

binding of the polynucleotide to a complementary DNA or RNA. For these techniques, preferred polynucleotides are usually oligonucleotides 20 to 40 bases in length and complementary to either the region of the gene involved in transcription (triple helix - see Lee et al., Nucl. Acids Res. 6:3073 (1979); Cooney et al., Science 241:456 (1988); and Dervan et al., Science 251:1360 (1991)) or to the mRNA itself (antisense - Okano, J. Neurochem. 56:560 (1991); Oligodeoxy-nucleotides as Antisense Inhibitors of Gene Expression, CRC Press, Boca Raton, FL (1988).) Triple helix formation optimally results in a shut-off of RNA transcription from DNA, while antisense RNA hybridization blocks translation of an mRNA molecule into polypeptide. The oligonucleotide described above can also be delivered to cells such that the antisense RNA or DNA may be expressed *in vivo* to inhibit production of polypeptide of the present invention antigens. Both techniques are effective in model systems, and the information disclosed herein can be used to design antisense or triple helix polynucleotides in an effort to treat disease, and in particular, for the treatment of proliferative diseases and/or conditions. Non-limiting antisense and triple helix methods encompassed by the present invention are more thoroughly described elsewhere herein (see, e.g., the section labeled "Antisense and Ribozyme (Antagonists)").

[0376] Polynucleotides of the present invention are also useful in gene therapy. One goal of gene therapy is to insert a normal gene into an organism having a defective gene, in an effort to correct the genetic defect. The polynucleotides disclosed in the present invention offer a means of targeting such genetic defects in a highly accurate manner. Another goal is to insert a new gene that was not present in the host genome, thereby producing a new trait in the host cell. Additional non-limiting examples of gene therapy methods encompassed by the present invention are more thoroughly described elsewhere herein (see, e.g., the sections labeled "Gene Therapy Methods" and Examples 16, 17 and 18).

[0377] The polynucleotides are also useful for identifying individuals from minute biological samples. The United States military, for example, is considering the use of restriction fragment length polymorphism (RFLP) for identification of its personnel. In this technique, an individual's genomic DNA is digested with one or more restriction enzymes, and probed on a Southern blot to yield unique bands for

identifying personnel. This method does not suffer from the current limitations of "Dog Tags" which can be lost, switched, or stolen, making positive identification difficult. The polynucleotides of the present invention can be used as additional DNA markers for RFLP.

[0378] The polynucleotides of the present invention can also be used as an alternative to RFLP, by determining the actual base-by-base DNA sequence of selected portions of an individual's genome. These sequences can be used to prepare PCR primers for amplifying and isolating such selected DNA, which can then be sequenced. Using this technique, individuals can be identified because each individual will have a unique set of DNA sequences. Once an unique ID database is established for an individual, positive identification of that individual, living or dead, can be made from extremely small tissue samples.

[0379] Forensic biology also benefits from using DNA-based identification techniques as disclosed herein. DNA sequences taken from very small biological samples such as tissues, e.g., hair or skin, or body fluids, e.g., blood, saliva, semen, synovial fluid, amniotic fluid, breast milk, lymph, pulmonary sputum or surfactant, urine, fecal matter, etc., can be amplified using PCR. In one prior art technique, gene sequences amplified from polymorphic loci, such as DQa class II HLA gene, are used in forensic biology to identify individuals. (Erich, H., PCR Technology, Freeman and Co. (1992).) Once these specific polymorphic loci are amplified, they are digested with one or more restriction enzymes, yielding an identifying set of bands on a Southern blot probed with DNA corresponding to the DQa class II HLA gene. Similarly, polynucleotides of the present invention can be used as polymorphic markers for forensic purposes.

[0380] There is also a need for reagents capable of identifying the source of a particular tissue. Such need arises, for example, in forensics when presented with tissue of unknown origin. Appropriate reagents can comprise, for example, DNA probes or primers prepared from the sequences of the present invention, specific to tissues, including but not limited to, those sequences referred to in Table 1A. Panels of such reagents can identify tissue by species and/or by organ type. In a similar fashion, these reagents can be used to screen tissue cultures for contamination. Additional non-limiting examples of such uses are further described herein.

[0381] Because reproductive system antigens are found expressed in reproductive system tissues, the polynucleotides of the present invention are also useful as hybridization probes for differential identification of the tissue(s) or cell type(s) present in a biological sample. Similarly, polypeptides and antibodies directed to polypeptides of the present invention are useful to provide immunological probes for differential identification of the tissue(s) (e.g., immunohistochemistry assays) or cell type(s) (e.g., immunocytochemistry assays). In a specific embodiment, the polynucleotides of the present invention are also useful as hybridization probes for differential identification of reproductive system tissue(s) or cell type(s) present in a biological sample. Similarly, polypeptides and antibodies directed to polypeptides of the present invention are useful to provide immunological probes for differential identification of reproductive system tissue(s) (e.g., immunohistochemistry assays) or cell type(s) (e.g., immunocytochemistry assays). In addition, for a number of disorders of the above tissues or cells, significantly higher or lower levels of gene expression of the polynucleotides/polypeptides of the present invention may be detected in certain tissues (e.g., tissues expressing polypeptides and/or polynucleotides of the present invention, for example, normal reproductive system tissues or diseased reproductive system tissues, and/or those tissues/cells corresponding to the library source relating to a polynucleotide sequence of the invention as disclosed in column 7 of Table 1A, and/or cancerous and/or wounded tissues) or bodily fluids (e.g., semen, lymph, vaginal pool, serum, plasma, urine, synovial fluid or spinal fluid) taken from an individual having such a disorder, relative to a "standard" gene expression level, i.e., the expression level in healthy tissue from an individual not having the disorder.

[0382] Thus, the invention provides a diagnostic method of a disorder, which involves: (a) assaying gene expression level in cells or body fluid of an individual; (b) comparing the gene expression level with a standard gene expression level, whereby an increase or decrease in the assayed gene expression level compared to the standard expression level is indicative of a disorder.

[0383] In the very least, the polynucleotides of the present invention can be used as molecular weight markers on Southern gels, as diagnostic probes for the presence of a specific mRNA in a particular cell type, as a probe to "subtract-out" known sequences in the process of discovering novel polynucleotides, for selecting and

making oligomers for attachment to a "gene chip" or other support, to raise anti-DNA antibodies using DNA immunization techniques, and as an antigen to elicit an immune response.

Uses of the Polypeptides

[0384] Each of the polypeptides identified herein can be used in numerous ways.

The following description should be considered exemplary and utilizes known techniques.

[0385] Polypeptides and antibodies directed to polypeptides of the present invention are useful to provide immunological probes for differential identification of the tissue(s) (e.g., immunohistochemistry assays such as, for example, ABC immunoperoxidase (Hsu et al., J. Histochem. Cytochem. 29:577-580 (1981)) or cell type(s) (e.g., immunocytochemistry assays).

[0386] Antibodies can be used to assay levels of polypeptides encoded by polynucleotides of the invention in a biological sample using classical immunohistological methods known to those of skill in the art (see, e.g., Jalkanen, et al., J. Cell. Biol. 101:976-985 (1985); Jalkanen, et al., J. Cell. Biol. 105:3087-3096 (1987)). Other antibody-based methods useful for detecting protein gene expression include immunoassays, such as the enzyme linked immunosorbent assay (ELISA) and the radioimmunoassay (RIA). Suitable antibody assay labels are known in the art and include enzyme labels, such as, glucose oxidase; radioisotopes, such as iodine (^{131}I , ^{125}I , ^{123}I , ^{121}I), carbon (^{14}C), sulfur (^{35}S), tritium (^3H), indium ($^{115\text{m}}\text{In}$, $^{113\text{m}}\text{In}$, ^{112}In , ^{111}In), and technetium (^{99}Tc , $^{99\text{m}}\text{Tc}$), thallium (^{201}Tl), gallium (^{68}Ga , ^{67}Ga), palladium (^{103}Pd), molybdenum (^{99}Mo), xenon (^{133}Xe), fluorine (^{18}F), ^{153}Sm , ^{177}Lu , ^{159}Gd , ^{149}Pm , ^{140}La , ^{175}Yb , ^{166}Ho , ^{90}Y , ^{47}Sc , ^{186}Re , ^{188}Re , ^{142}Pr , ^{105}Rh , ^{97}Ru ; luminescent labels, such as luminol; and fluorescent labels, such as fluorescein and rhodamine, and biotin.

[0387] In addition to assaying levels of polypeptide of the present invention in a biological sample, proteins can also be detected *in vivo* by imaging. Antibody labels or markers for *in vivo* imaging of protein include those detectable by X-radiography, NMR or ESR. For X-radiography, suitable labels include radioisotopes such as barium or cesium, which emit detectable radiation but are not overtly harmful to the subject. Suitable markers for NMR and ESR include those with a detectable

characteristic spin, such as deuterium, which may be incorporated into the antibody by labeling of nutrients for the relevant hybridoma.

[0388] A reproductive system antigen-specific antibody or antibody fragment which has been labeled with an appropriate detectable imaging moiety, such as a radioisotope (for example, ^{131}I , ^{112}In , $^{99\text{m}}\text{Tc}$, (^{131}I , ^{125}I , ^{123}I , ^{121}I), carbon (^{14}C), sulfur (^{35}S), tritium (^3H), indium ($^{115\text{m}}\text{In}$, $^{113\text{m}}\text{In}$, ^{112}In , ^{111}In), and technetium (^{99}Tc , $^{99\text{m}}\text{Tc}$), thallium (^{201}Tl), gallium (^{68}Ga , ^{67}Ga), palladium (^{103}Pd), molybdenum (^{99}Mo), xenon (^{133}Xe), fluorine (^{18}F , ^{153}Sm , ^{177}Lu , ^{159}Gd , ^{149}Pm , ^{140}La , ^{175}Yb , ^{166}Ho , ^{90}Y , ^{47}Sc , ^{186}Re , ^{188}Re , ^{142}Pr , ^{105}Rh , ^{97}Ru), a radio-opaque substance, or a material detectable by nuclear magnetic resonance, is introduced (for example, parenterally, subcutaneously or intraperitoneally) into the mammal to be examined for reproductive system disorder. It will be understood in the art that the size of the subject and the imaging system used will determine the quantity of imaging moiety needed to produce diagnostic images. In the case of a radioisotope moiety, for a human subject, the quantity of radioactivity injected will normally range from about 5 to 20 millicuries of $^{99\text{m}}\text{Tc}$. The labeled antibody or antibody fragment will then preferentially accumulate at the location of cells which express the polypeptide encoded by a polynucleotide of the invention. *In vivo* tumor imaging is described in S.W. Burchiel et al., "Immunopharmacokinetics of Radiolabeled Antibodies and Their Fragments" (Chapter 13 in *Tumor Imaging: The Radiochemical Detection of Cancer*, S.W. Burchiel and B. A. Rhodes, eds., Masson Publishing Inc. (1982)).

[0389] In one embodiment, the invention provides a method for the specific delivery of compositions of the invention to cells by administering polypeptides of the invention (e.g., polypeptides encoded by polynucleotides of the invention and/or antibodies) that are associated with heterologous polypeptides or nucleic acids. In one example, the invention provides a method for delivering a therapeutic protein into the targeted cell. In another example, the invention provides a method for delivering a single stranded nucleic acid (e.g., antisense or ribozymes) or double stranded nucleic acid (e.g., DNA that can integrate into the cell's genome or replicate episomally and that can be transcribed) into the targeted cell.

[0390] In another embodiment, the invention provides a method for the specific destruction of cells (e.g., the destruction of tumor cells) by administering polypeptides of the invention in association with toxins or cytotoxic prodrugs.

[0391] In a preferred embodiment, the invention provides a method for the specific destruction of reproductive system cells (e.g., aberrant reproductive system cells, neoplasms of the reproductive system) by administering polypeptides of the invention (e.g., polypeptides encoded by polynucleotides of the invention and/or antibodies) in association with toxins or cytotoxic prodrugs. In another preferred embodiment the invention provides a method for the specific destruction of tissues/cells corresponding to the library source relating to a polynucleotide sequence of the invention as disclosed in column 7 of Table 1A by administering polypeptides of the invention in association with toxins or cytotoxic prodrugs.

[0392] By "toxin" is meant one or more compounds that bind and activate endogenous cytotoxic effector systems, radioisotopes, holotoxins, modified toxins, catalytic subunits of toxins, or any molecules or enzymes not normally present in or on the surface of a cell that under defined conditions cause the cell's death. Toxins that may be used according to the methods of the invention include, but are not limited to, radioisotopes known in the art, compounds such as, for example, antibodies (or complement fixing containing portions thereof) that bind an inherent or induced endogenous cytotoxic effector system, thymidine kinase, endonuclease, RNase, alpha toxin, ricin, abrin, *Pseudomonas* exotoxin A, diphtheria toxin, saporin, momordin, gelonin, pokeweed antiviral protein, alpha-sarcin and cholera toxin. "Toxin" also includes a cytostatic or cytocidal agent, a therapeutic agent or a radioactive metal ion, e.g., alpha-emitters such as, for example, ^{213}Bi , or other radioisotopes such as, for example, ^{103}Pd , ^{133}Xe , ^{131}I , ^{111}In , ^{68}Ge , ^{57}Co , ^{65}Zn , ^{85}Sr , ^{32}P , ^{35}S , ^{90}Y , ^{153}Sm , ^{153}Gd , ^{169}Yb , ^{51}Cr , ^{54}Mn , ^{75}Se , ^{113}Sn , $^{90}\text{Yttrium}$, ^{117}Tin , $^{186}\text{Rhenium}$, $^{166}\text{Holmium}$, and $^{188}\text{Rhenium}$; luminescent labels, such as luminol; and fluorescent labels, such as fluorescein and rhodamine, and biotin.

[0393] In a specific embodiment, the invention provides a method for the specific destruction of cells (e.g., the destruction of tumor cells) by administering polypeptides of the invention or antibodies of the invention in association with the radioisotope ^{90}Y . In another specific embodiment, the invention provides a method for the specific

destruction of cells (e.g., the destruction of tumor cells) by administering polypeptides of the invention or antibodies of the invention in association with the radioisotope ^{111}In . In a further specific embodiment, the invention provides a method for the specific destruction of cells (e.g., the destruction of tumor cells) by administering polypeptides of the invention or antibodies of the invention in association with the radioisotope ^{131}I .

[0394] Techniques known in the art may be applied to label polypeptides of the invention (including antibodies). Such techniques include, but are not limited to, the use of bifunctional conjugating agents (see e.g., U.S. Patent Nos. 5,756,065; 5,714,631; 5,696,239; 5,652,361; 5,505,931; 5,489,425; 5,435,990; 5,428,139; 5,342,604; 5,274,119; 4,994,560; and 5,808,003; the contents of each of which are hereby incorporated by reference in its entirety).

[0395] Thus, the invention provides a diagnostic method of a disorder, which involves (a) assaying the expression level of a polypeptide of the present invention in cells or body fluid of an individual; and (b) comparing the assayed polypeptide expression level with a standard polypeptide expression level, whereby an increase or decrease in the assayed polypeptide expression level compared to the standard expression level is indicative of a disorder. With respect to cancer, the presence of a relatively high amount of transcript in biopsied tissue from an individual may indicate a predisposition for the development of the disease, or may provide a means for detecting the disease prior to the appearance of actual clinical symptoms. A more definitive diagnosis of this type may allow health professionals to employ preventative measures or aggressive treatment earlier thereby preventing the development or further progression of the cancer.

[0396] Moreover, polypeptides of the present invention can be used to treat or prevent diseases or conditions of the reproductive system such as, for example, reproductive system injury and trauma, infections, neoplastic disorders, congenital defects, and diseases or disorders which result in infertility, complications with pregnancy, labor, or parturition, postpartum difficulties, and as listed below in the section entitled "Reproductive System Disorders". In preferred embodiments, polynucleotides expressed in a particular tissue type (see, e.g., Table 1A, column 7) are used to diagnose, detect, prevent, treat and/or prognose disorders associated with

the tissue type. For example, patients can be administered a polypeptide of the present invention in an effort to replace absent or decreased levels of the polypeptide (e.g., insulin), to supplement absent or decreased levels of a different polypeptide (e.g., hemoglobin S for hemoglobin B, SOD, catalase, DNA repair proteins), to inhibit the activity of a polypeptide (e.g., an oncogene or tumor suppressor), to activate the activity of a polypeptide (e.g., by binding to a receptor), to reduce the activity of a membrane bound receptor by competing with it for free ligand (e.g., soluble TNF receptors used in reducing inflammation), or to bring about a desired response (e.g., blood vessel growth inhibition, enhancement of the immune response to proliferative cells or tissues).

[0397] Similarly, antibodies directed to a polypeptide of the present invention can also be used to treat disease (as described *supra*, and elsewhere herein). For example, administration of an antibody directed to a polypeptide of the present invention can bind, and/or neutralize the polypeptide, and/or reduce overproduction of the polypeptide. Similarly, administration of an antibody can activate the polypeptide, such as by binding to a polypeptide bound to a membrane (receptor).

[0398] At the very least, the polypeptides of the present invention can be used as molecular weight markers on SDS-PAGE gels or on molecular sieve gel filtration columns using methods well known to those of skill in the art. Polypeptides can also be used to raise antibodies, which in turn are used to measure protein expression from a recombinant cell, as a way of assessing transformation of the host cell. Moreover, the polypeptides of the present invention can be used to test the biological activities described herein.

Diagnostic Assays

[0399] The compounds of the present invention are useful for diagnosis, treatment, prevention and/or prognosis of various reproductive system related disorders in mammals, preferably humans. Such disorders include, but are not limited to, reproductive system injury and trauma, infections, neoplastic disorders, congenital defects, and diseases or disorders which result in infertility, complications with pregnancy, labor, or parturition, postpartum difficulties, and as listed below in the section entitled "Reproductive System Disorders". In preferred embodiments,

polynucleotides expressed in a particular tissue type (see, e.g., Table 1A, column 7) are used to diagnose, detect, prevent, treat and/or prognose disorders associated with the tissue type.

[0400] Reproductive system antigens are expressed in reproductive system. For a number of reproductive system-related disorders, substantially altered (increased or decreased) levels of reproductive system antigen gene expression can be detected in reproductive system tissue or other cells or bodily fluids (e.g., sera, plasma, urine, semen, synovial fluid or spinal fluid) taken from an individual having such a disorder, relative to a "standard" reproductive system antigen gene expression level, that is, the reproductive system antigen expression level in reproductive system tissues or bodily fluids from an individual not having the reproductive system disorder. Thus, the invention provides a diagnostic method useful during diagnosis of a reproductive system disorder, which involves measuring the expression level of the gene encoding the reproductive system associated polypeptide in reproductive system tissue or other cells or body fluid from an individual and comparing the measured gene expression level with a standard reproductive system antigens gene expression level, whereby an increase or decrease in the gene expression level(s) compared to the standard is indicative of an reproductive system disorder.

[0401] In specific embodiments, the invention provides a diagnostic method useful during diagnosis of a disorder of a normal or diseased tissue/cell source corresponding to column 7 of Table 1A, which involves measuring the expression level of the coding sequence of a polynucleotide sequence associated with this tissue/cell source as disclosed in Table 1A in the tissue/cell source or other cells or body fluid from an individual and comparing the expression level of the coding sequence with a standard expression level of the coding sequence of a polynucleotide sequence, whereby an increase or decrease in the gene expression level(s) compared to the standard is indicative of a disorder of a normal or diseased tissue/cell source corresponding to column 7 of Table 1A.

[0402] In particular, it is believed that certain tissues in mammals with cancer of cells or tissue of the reproductive system express significantly enhanced or reduced levels of normal or altered reproductive system antigen expression and mRNA encoding the reproductive system associated polypeptide when compared to a

corresponding "standard" level. Further, it is believed that enhanced or depressed levels of the reproductive system associated polypeptide can be detected in certain body fluids (e.g., sera, plasma, urine, and spinal fluid) or cells or tissue from mammals with such a cancer when compared to sera from mammals of the same species not having the cancer.

[0403] For example, as disclosed herein, reproductive system associated polypeptides of the invention are expressed in tissues of the reproductive system. Accordingly, polynucleotides of the invention (e.g., polynucleotide sequences complementary to all or a portion of a reproductive system antigen mRNA nucleotide sequence of SEQ ID NO:X, nucleotide sequence encoding SEQ ID NO:Y, nucleotide sequence encoding a polypeptide encoded by SEQ ID NO:X and/or a nucleotide sequence delineated by columns 8 and 9 of Table 2) and antibodies (and antibody fragments) directed against the polypeptides of the invention may be used to quantitate or qualitate concentrations of cells of the reproductive system expressing reproductive system antigens, preferably on their cell surfaces. These polynucleotides and antibodies additionally have diagnostic applications in detecting abnormalities in the level of reproductive system antigens gene expression, or abnormalities in the structure and/or temporal, tissue, cellular, or subcellular location of reproductive system antigens. These diagnostic assays may be performed *in vivo* or *in vitro*, such as, for example, on blood samples, biopsy tissue or autopsy tissue. In specific embodiments, polynucleotides and antibodies of the invention are used to quantitate or qualitate tissues/cells corresponding to the library source disclosed in column 7 of Table 1A expressing the corresponding reproductive system sequence disclosed in the same row of Table 1A, preferably on their cell surface.

[0404] Thus, the invention provides a diagnostic method useful during diagnosis of a reproductive system disorder, including cancers, which involves measuring the expression level of the gene encoding the reproductive system antigen polypeptide in tissues of the reproductive system or other cells or body fluid from an individual and comparing the measured gene expression level with a standard reproductive system antigen gene expression level, whereby an increase or decrease in the gene expression level compared to the standard is indicative of a reproductive system disorder. In specific embodiments, polynucleotides and antibodies of the invention are used to

quantitate or qualitate tissues/cells corresponding to the library source disclosed in column 7 of Table 1A expressing the corresponding reproductive system sequence disclosed in the same row of Table 1A, preferably on their cell surface.

[0405] Where a diagnosis of a disorder in the reproductive system, including diagnosis of a tumor, has already been made according to conventional methods, the present invention is useful as a prognostic indicator, whereby patients exhibiting enhanced or depressed reproductive system antigen gene expression will experience a worse clinical outcome relative to patients expressing the gene at a level nearer the standard level.

[0406] By "assaying the expression level of the gene encoding the reproductive system associated polypeptide" is intended qualitatively or quantitatively measuring or estimating the level of the reproductive system antigen polypeptide or the level of the mRNA encoding the reproductive system antigen polypeptide in a first biological sample either directly (e.g., by determining or estimating absolute protein level or mRNA level) or relatively (e.g., by comparing to the reproductive system associated polypeptide level or mRNA level in a second biological sample). Preferably, the reproductive system antigen polypeptide expression level or mRNA level in the first biological sample is measured or estimated and compared to a standard reproductive system antigen polypeptide level or mRNA level, the standard being taken from a second biological sample obtained from an individual not having the disorder or being determined by averaging levels from a population of individuals not having a disorder of the reproductive system. As will be appreciated in the art, once a standard reproductive system antigen polypeptide level or mRNA level is known, it can be used repeatedly as a standard for comparison.

[0407] By "biological sample" is intended any biological sample obtained from an individual, cell line, tissue culture, or other source containing reproductive system antigen polypeptides (including portions thereof) or mRNA. As indicated, biological samples include body fluids (such as sera, plasma, urine, synovial fluid and spinal fluid) which contain cells expressing reproductive system antigen polypeptides, tissues of the reproductive system, and other tissue sources found to express the full length or fragments thereof of a reproductive system antigen. Methods for obtaining tissue biopsies and body fluids from mammals are well known in the art. Where the

biological sample is to include mRNA, a tissue biopsy is the preferred source.

[0408] Total cellular RNA can be isolated from a biological sample using any suitable technique such as the single-step guanidinium-thiocyanate-phenol-chloroform method described in Chomczynski and Sacchi, *Anal. Biochem.* 162:156-159 (1987). Levels of mRNA encoding the reproductive system antigen polypeptides are then assayed using any appropriate method. These include Northern blot analysis, S1 nuclease mapping, the polymerase chain reaction (PCR), reverse transcription in combination with the polymerase chain reaction (RT-PCR), and reverse transcription in combination with the ligase chain reaction (RT-LCR).

[0409] The present invention also relates to diagnostic assays such as quantitative and diagnostic assays for detecting levels of reproductive system antigen polypeptides, in a biological sample (e.g., cells and tissues), including determination of normal and abnormal levels of polypeptides. Thus, for instance, a diagnostic assay in accordance with the invention for detecting over-expression of reproductive system antigens compared to normal control tissue samples may be used to detect the presence of tumors. Assay techniques that can be used to determine levels of a polypeptide, such as a reproductive system antigen polypeptide of the present invention in a sample derived from a host are well-known to those of skill in the art. Such assay methods include radioimmunoassays, competitive-binding assays, Western Blot analysis and ELISA assays. Assaying reproductive system antigen polypeptide levels in a biological sample can occur using any art-known method.

[0410] Assaying reproductive system antigen polypeptide levels in a biological sample can occur using antibody-based techniques. For example, reproductive system antigen polypeptide expression in tissues can be studied with classical immunohistological methods (Jalkanen et al., *J. Cell. Biol.* 101:976-985 (1985); Jalkanen, M., et al., *J. Cell. Biol.* 105:3087-3096 (1987)). Other antibody-based methods useful for detecting reproductive system antigen polypeptide gene expression include immunoassays, such as the enzyme linked immunosorbent assay (ELISA) and the radioimmunoassay (RIA). Suitable antibody assay labels are known in the art and include enzyme labels, such as, glucose oxidase, and radioisotopes, such as iodine (^{125}I , ^{121}I), carbon (^{14}C), sulfur (^{35}S), tritium (^3H), indium (^{112}In), and technetium ($^{99\text{m}}\text{Tc}$), and fluorescent labels, such as fluorescein and rhodamine, and biotin.

- [0411] The tissue or cell type to be analyzed will generally include those which are known, or suspected, to express the reproductive system related antigen gene (such as, for example, cells of the reproductive system or cancers of the reproductive system). The protein isolation methods employed herein may, for example, be such as those described in Harlow and Lane (Harlow, E. and Lane, D., 1988, "Antibodies: A Laboratory Manual", Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York), which is incorporated herein by reference in its entirety. The isolated cells can be derived from cell culture or from a patient. The analysis of cells taken from culture may be a necessary step in the assessment of cells that could be used as part of a cell-based gene therapy technique or, alternatively, to test the effect of compounds on the expression of the reproductive system related antigen gene.
- [0412] For example, antibodies, or fragments of antibodies, such as those described herein, may be used to quantitatively or qualitatively detect the presence of reproductive system related antigen gene products or conserved variants or peptide fragments thereof. This can be accomplished, for example, by immunofluorescence techniques employing a fluorescently labeled antibody coupled with light microscopic, flow cytometric, or fluorimetric detection.
- [0413] In a preferred embodiment, antibodies, or fragments of antibodies directed to any one or all of the predicted epitope domains of the reproductive system related antigen polypeptides (Shown in Table 1A, column 6) may be used to quantitatively or qualitatively detect the presence of reproductive system related antigen gene products or conserved variants or peptide fragments thereof. This can be accomplished, for example, by immunofluorescence techniques employing a fluorescently labeled antibody coupled with light microscopic, flow cytometric, or fluorimetric detection.
- [0414] In an additional preferred embodiment, antibodies, or fragments of antibodies directed to a conformational epitope of a reproductive system related antigen may be used to quantitatively or qualitatively detect the presence of reproductive system related antigen gene products or conserved variants or peptide fragments thereof. This can be accomplished, for example, by immunofluorescence techniques employing a fluorescently labeled antibody coupled with light microscopic, flow cytometric, or fluorimetric detection.
- [0415] The antibodies (or fragments thereof), and/or reproductive system related

antigen polypeptides of the present invention may, additionally, be employed histologically, as in immunofluorescence, immunoelectron microscopy or non-immunological assays, for in situ detection of reproductive system related antigen gene products or conserved variants or peptide fragments thereof. In situ detection may be accomplished by removing a histological specimen from a patient, and applying thereto a labeled antibody or reproductive system related antigen polypeptide of the present invention. The antibody (or fragment thereof) or reproductive system related antigen polypeptide is preferably applied by overlaying the labeled antibody (or fragment) onto a biological sample. Through the use of such a procedure, it is possible to determine not only the presence of the reproductive system related antigen gene product, or conserved variants or peptide fragments, or reproductive system related antigen polypeptide binding, but also its distribution in the examined tissue. Using the present invention, those of ordinary skill will readily perceive that any of a wide variety of histological methods (such as staining procedures) can be modified in order to achieve such in situ detection.

[0416] Immunoassays and non-immunoassays for reproductive system related antigen gene products or conserved variants or peptide fragments thereof will typically comprise incubating a sample, such as a biological fluid, a tissue extract, freshly harvested cells, or lysates of cells which have been incubated in cell culture, in the presence of a detectably labeled antibody capable of binding reproductive system related antigen gene products or conserved variants or peptide fragments thereof, and detecting the bound antibody by any of a number of techniques well-known in the art.

[0417] The biological sample may be brought in contact with and immobilized onto a solid phase support or carrier such as nitrocellulose, or other solid support which is capable of immobilizing cells, cell particles or soluble proteins. The support may then be washed with suitable buffers followed by treatment with the detectably labeled anti- reproductive system related antigen antibody or detectable reproductive system related antigen polypeptide. The solid phase support may then be washed with the buffer a second time to remove unbound antibody or polypeptide. Optionally the antibody is subsequently labeled. The amount of bound label on solid support may then be detected by conventional means.

[0418] By "solid phase support or carrier" is intended any support capable of

binding an antigen or an antibody. Well-known supports or carriers include glass, polystyrene, polypropylene, polyethylene, dextran, nylon, amylases, natural and modified celluloses, polyacrylamides, gabbros, and magnetite. The nature of the carrier can be either soluble to some extent or insoluble for the purposes of the present invention. The support material may have virtually any possible structural configuration so long as the coupled molecule is capable of binding to an antigen or antibody. Thus, the support configuration may be spherical, as in a bead, or cylindrical, as in the inside surface of a test tube, or the external surface of a rod. Alternatively, the surface may be flat such as a sheet, test strip, etc. Preferred supports include polystyrene beads. Those skilled in the art will know many other suitable carriers for binding antibody or antigen, or will be able to ascertain the same by use of routine experimentation.

[0419] The binding activity of a given lot of anti- reproductive system related antigen antibody or reproductive system related antigen polypeptide may be determined according to well known methods. Those skilled in the art will be able to determine operative and optimal assay conditions for each determination by employing routine experimentation.

[0420] In addition to assaying reproductive system related antigen polypeptide levels or polynucleotide levels in a biological sample obtained from an individual, reproductive system related antigen polypeptide or polynucleotide can also be detected *in vivo* by imaging. For example, in one embodiment of the invention, reproductive system related antigen polypeptide and/or anti- reproductive system related antigen antibodies are used to image reproductive system diseased cells, such as neoplasms. In another embodiment, reproductive system related antigen polynucleotides of the invention (e.g., polynucleotides complementary to all or a portion of reproductive system related antigen mRNA) and/or anti- reproductive system related antigen antibodies (e.g., antibodies directed to any one or a combination of the epitopes of reproductive system related antigens, antibodies directed to a conformational epitope of reproductive system related antigens, antibodies directed to the full length polypeptide expressed on the cell surface of a mammalian cell) are used to image diseased or neoplastic cells of the reproductive system.

[0421] Antibody labels or markers for *in vivo* imaging of reproductive system

related antigen polypeptides include those detectable by X-radiography, NMR, MRI, CAT-scans or ESR. For X-radiography, suitable labels include radioisotopes such as barium or cesium, which emit detectable radiation but are not overtly harmful to the subject. Suitable markers for NMR and ESR include those with a detectable characteristic spin, such as deuterium, which may be incorporated into the antibody by labeling of nutrients for the relevant hybridoma. Where *in vivo* imaging is used to detect enhanced levels of reproductive system related antigen polypeptides for diagnosis in humans, it may be preferable to use human antibodies or "humanized" chimeric monoclonal antibodies. Such antibodies can be produced using techniques described herein or otherwise known in the art. For example methods for producing chimeric antibodies are known in the art. See, for review, Morrison, Science 229:1202 (1985); Oi et al., BioTechniques 4:214 (1986); Cabilly et al., U.S. Patent No. 4,816,567; Taniguchi et al., EP 171496; Morrison et al., EP 173494; Neuberger et al., WO 8601533; Robinson et al., WO 8702671; Boulianne et al., Nature 312:643 (1984); Neuberger et al., Nature 314:268 (1985).

[0422] Additionally, any reproductive system related antigen polypeptides whose presence can be detected, can be administered. For example, reproductive system related antigen polypeptides labeled with a radio-opaque or other appropriate compound can be administered and visualized *in vivo*, as discussed, above for labeled antibodies. Further such reproductive system related antigen polypeptides can be utilized for *in vitro* diagnostic procedures.

[0423] A reproductive system related antigen polypeptide-specific antibody or antibody fragment which has been labeled with an appropriate detectable imaging moiety, such as a radioisotope (for example, ^{131}I , ^{112}In , $^{99\text{m}}\text{Tc}$), a radio-opaque substance, or a material detectable by nuclear magnetic resonance, is introduced (for example, parenterally, subcutaneously or intraperitoneally) into the mammal to be examined for a disorder of the reproductive system. It will be understood in the art that the size of the subject and the imaging system used will determine the quantity of imaging moiety needed to produce diagnostic images. In the case of a radioisotope moiety, for a human subject, the quantity of radioactivity injected will normally range from about 5 to 20 millicuries of $^{99\text{m}}\text{Tc}$. The labeled antibody or antibody fragment will then preferentially accumulate at the location of cells which contain reproductive

system related antigen protein. *In vivo* tumor imaging is described in S.W. Burchiel et al., "Immunopharmacokinetics of Radiolabeled Antibodies and Their Fragments" (Chapter 13 in *Tumor Imaging: The Radiochemical Detection of Cancer*, S.W. Burchiel and B. A. Rhodes, eds., Masson Publishing Inc. (1982)).

[0424] With respect to antibodies, one of the ways in which the anti-reproductive system related antigen antibody can be detectably labeled is by linking the same to an enzyme and using the linked product in an enzyme immunoassay (EIA) (Voller, A., "The Enzyme Linked Immunosorbent Assay (ELISA)", 1978, Diagnostic Horizons 2:1-7, Microbiological Associates Quarterly Publication, Walkersville, MD); Voller et al., J. Clin. Pathol. 31:507-520 (1978); Butler, J.E., Meth. Enzymol. 73:482-523 (1981); Maggio, E. (ed.), 1980, Enzyme Immunoassay, CRC Press, Boca Raton, FL.; Ishikawa, E. et al., (eds.), 1981, Enzyme Immunoassay, Kigaku Shoin, Tokyo). The enzyme which is bound to the antibody will react with an appropriate substrate, preferably a chromogenic substrate, in such a manner as to produce a chemical moiety which can be detected, for example, by spectrophotometric, fluorimetric or by visual means. Enzymes which can be used to detectably label the antibody include, but are not limited to, malate dehydrogenase, staphylococcal nuclease, delta-5-steroid isomerase, yeast alcohol dehydrogenase, alpha-glycerophosphate, dehydrogenase, triose phosphate isomerase, horseradish peroxidase, alkaline phosphatase, asparaginase, glucose oxidase, beta-galactosidase, ribonuclease, urease, catalase, glucose-6-phosphate dehydrogenase, glucoamylase and acetylcholinesterase. Additionally, the detection can be accomplished by colorimetric methods which employ a chromogenic substrate for the enzyme. Detection may also be accomplished by visual comparison of the extent of enzymatic reaction of a substrate in comparison with similarly prepared standards.

[0425] Detection may also be accomplished using any of a variety of other immunoassays. For example, by radioactively labeling the antibodies or antibody fragments, it is possible to detect reproductive system related antigens through the use of a radioimmunoassay (RIA) (see, for example, Weintraub, B., Principles of Radioimmunoassays, Seventh Training Course on Radioligand Assay Techniques, The Endocrine Society, March, 1986, which is incorporated by reference herein). The radioactive isotope can be detected by means including, but not limited to, a gamma

counter, a scintillation counter, or autoradiography.

[0426] It is also possible to label the antibody with a fluorescent compound. When the fluorescently labeled antibody is exposed to light of the proper wave length, its presence can then be detected due to fluorescence. Among the most commonly used fluorescent labeling compounds are fluorescein isothiocyanate, rhodamine, phycoerythrin, phycocyanin, allophycocyanin, ophthaldehyde and fluorescamine.

[0427] The antibody can also be detectably labeled using fluorescence emitting metals such as ^{152}Eu , or others of the lanthanide series. These metals can be attached to the antibody using such metal chelating groups as diethylenetriaminepentaacetic acid (DTPA) or ethylenediaminetetraacetic acid (EDTA).

[0428] The antibody also can be detectably labeled by coupling it to a chemiluminescent compound. The presence of the chemiluminescent-tagged antibody is then determined by detecting the presence of luminescence that arises during the course of a chemical reaction. Examples of particularly useful chemiluminescent labeling compounds are luminol, isoluminol, theromatic acridinium ester, imidazole, acridinium salt and oxalate ester.

[0429] Likewise, a bioluminescent compound may be used to label the antibody of the present invention. Bioluminescence is a type of chemiluminescence found in biological systems in, which a catalytic protein increases the efficiency of the chemiluminescent reaction. The presence of a bioluminescent protein is determined by detecting the presence of luminescence. Important bioluminescent compounds for purposes of labeling are luciferin, luciferase and aequorin.

Methods for Detecting Diseases of the Reproductive System, Including Cancer

[0430] In general, a disease of the reproductive system or cancer may be detected in a patient based on the presence of one or more reproductive system related antigen proteins of the invention and/or polynucleotides encoding such proteins in a biological sample (for example, blood, sera, urine, and/or tumor biopsies) obtained from the patient. In other words, such proteins and/or polynucleotides may be used as markers to indicate the presence or absence of a reproductive system disease or disorder, including cancer. Cancers that may be diagnosed, and/or prognosed using the compositions of the invention include but are not limited to, cancers of the

reproductive system. In addition, such proteins and/or polynucleotides may be useful for the detection of other diseases and cancers, including cancers of tissues/cells corresponding to the library source disclosed in column 7 of Table 1A expressing the corresponding reproductive system related sequence disclosed in the same row of Table 1A. The binding agents provided herein generally permit detection of the level of antigen that binds to the agent in the biological sample. Polynucleotide primers and probes may be used to detect the level of mRNA encoding reproductive system related antigen polypeptides, which is also indicative of the presence or absence of a reproductive system disease or disorder, including cancer. In general, reproductive system related antigen polypeptides should be present at a level that is at least three fold higher in diseased tissue than in normal tissue.

[0431] There are a variety of assay formats known to those of ordinary skill in the art for using a binding agent to detect polypeptide markers in a sample. See, e.g., Harlow and Lane, *supra*. In general, the presence or absence of a reproductive system disease in a patient may be determined by (a) contacting a biological sample obtained from a patient with a binding agent; (b) detecting in the sample a level of polypeptide that binds to the binding agent; and (c) comparing the level of polypeptide with a predetermined cut-off value.

[0432] In a preferred embodiment, the assay involves the use of binding agent immobilized on a solid support to bind to and remove the reproductive system related antigen polypeptide of the invention from the remainder of the sample. The bound polypeptide may then be detected using a detection reagent that contains a reporter group and specifically binds to the binding agent/polypeptide complex. Such detection reagents may comprise, for example, a binding agent that specifically binds to the polypeptide or an antibody or other agent that specifically binds to the binding agent, such as an anti-immunoglobulin, protein G, protein A or a lectin. Alternatively, a competitive assay may be utilized, in which a polypeptide is labeled with a reporter group and allowed to bind to the immobilized binding agent after incubation of the binding agent with the sample. The extent to which components of the sample inhibit the binding of the labeled polypeptide to the binding agent is indicative of the reactivity of the sample with the immobilized binding agent. Suitable polypeptides for

use within such assays include reproductive system related antigen polypeptides and portions thereof, or antibodies, to which the binding agent binds, as described above.

[0433] The solid support may be any material known to those of skill in the art to which reproductive system related antigen polypeptides of the invention may be attached. For example, the solid support may be a test well in a microtiter plate or a nitrocellulose or other suitable membrane. Alternatively, the support may be a bead or disc, such as glass, fiberglass, latex or a plastic material such as polystyrene or polyvinylchloride. The support may also be a magnetic particle or a fiber optic sensor, such as those disclosed, for example, in U.S. Patent No. 5,359,681. The binding agent may be immobilized on the solid support using a variety of techniques known to those of skill in the art, which are amply described in the patent and scientific literature. In the context of the present invention, the term "immobilization" refers to both noncovalent association, such as adsorption, and covalent attachment (which may be a direct linkage between the agent and functional groups on the support or may be a linkage by way of a cross-linking agent). Immobilization by adsorption to a well in a microtiter plate or to a membrane is preferred. In such cases, adsorption may be achieved by contacting the binding agent, in a suitable buffer, with the solid support for the suitable amount of time. The contact time varies with temperature, but is typically between about 1 hour and about 1 day. In general, contacting a well of plastic microtiter plate (such as polystyrene or polyvinylchloride) with an amount of binding agent ranging from about 10 ng to about 10 ug, and preferably about 100 ng to about 1 ug, is sufficient to immobilize an adequate amount of binding agent.

[0434] Covalent attachment of binding agent to a solid support may generally be achieved by first reacting the support with a bifunctional reagent that will react with both the support and a functional group, such as a hydroxyl or amino group, on the binding agent. For example, the binding agent may be covalently attached to supports having an appropriate polymer coating using benzoquinone or by condensation of an aldehyde group on the support with an amine and an active hydrogen on the binding partner (see, e.g., Pierce Immunotechnology Catalog and Handbook, 1991, at A12-A13).

Gene Therapy Methods

[0435] Also encompassed by the present invention are gene therapy methods for treating or preventing disorders, diseases and conditions. The gene therapy methods relate to the introduction of nucleic acid (DNA, RNA and antisense DNA or RNA) sequences into an animal to achieve expression of a reproductive system related antigen of the present invention. This method requires a polynucleotide which codes for a polypeptide of the present invention operatively linked to a promoter and any other genetic elements necessary for the expression of the polypeptide by the target tissue. Such gene therapy and delivery techniques are known in the art, see, for example, WO90/11092, which is herein incorporated by reference.

[0436] Thus, for example, cells from a patient may be engineered with a polynucleotide (DNA or RNA) comprising a promoter operably linked to a polynucleotide of the present invention ex vivo, with the engineered cells then being provided to a patient to be treated with the polypeptide of the present invention. Such methods are well-known in the art. For example, see Belldgrun, A., et al., J. Natl. Cancer Inst. 85: 207-216 (1993); Ferrantini, M. et al., Cancer Research 53: 1107-1112 (1993); Ferrantini, M. et al., J. Immunology 153: 4604-4615 (1994); Kaido, T., et al., Int. J. Cancer 60: 221-229 (1995); Ogura, H., et al., Cancer Research 50: 5102-5106 (1990); Santodonato, L., et al., Human Gene Therapy 7:1-10 (1996); Santodonato, L., et al., Gene Therapy 4:1246-1255 (1997); and Zhang, J.-F. et al., Cancer Gene Therapy 3: 31-38 (1996)), which are herein incorporated by reference. In one embodiment, the cells which are engineered are arterial cells. The arterial cells may be reintroduced into the patient through direct injection to the artery, the tissues surrounding the artery, or through catheter injection.

[0437] As discussed in more detail below, the polynucleotide constructs can be delivered by any method that delivers injectable materials to the cells of an animal, such as, injection into the interstitial space of tissues (heart, muscle, skin, lung, liver, and the like). The polynucleotide constructs may be delivered in a pharmaceutically acceptable liquid or aqueous carrier.

[0438] In one embodiment, the polynucleotide of the present invention is delivered as a naked polynucleotide. The term "naked" polynucleotide, DNA or RNA refers to sequences that are free from any delivery vehicle that acts to assist, promote or

facilitate entry into the cell, including viral sequences, viral particles, liposome formulations, lipofectin or precipitating agents and the like. However, the polynucleotide of the present invention can also be delivered in liposome formulations and lipofectin formulations and the like can be prepared by methods well known to those skilled in the art. Such methods are described, for example, in U.S. Patent Nos. 5,593,972, 5,589,466, and 5,580,859, which are herein incorporated by reference.

[0439] The polynucleotide vector constructs used in the gene therapy method are preferably constructs that will not integrate into the host genome nor will they contain sequences that allow for replication. Appropriate vectors include pWLNEO, pSV2CAT, pOG44, pXT1 and pSG available from Stratagene; pSVK3, pBPV, pMSG and pSVL available from Pharmacia; and pEF1/V5, pcDNA3.1, and pRc/CMV2 available from Invitrogen. Other suitable vectors will be readily apparent to the skilled artisan.

[0440] Any strong promoter known to those skilled in the art can be used for driving the expression of the polynucleotide sequence. Suitable promoters include adenoviral promoters, such as the adenoviral major late promoter; or heterologous promoters, such as the cytomegalovirus (CMV) promoter; the respiratory syncytial virus (RSV) promoter; inducible promoters, such as the MMT promoter, the metallothionein promoter; heat shock promoters; the albumin promoter; the ApoAI promoter; human globin promoters; viral thymidine kinase promoters, such as the Herpes Simplex thymidine kinase promoter; retroviral LTRs; the b-actin promoter; and human growth hormone promoters. The promoter also may be the native promoter for the polynucleotide of the present invention.

[0441] Unlike other gene therapy techniques, one major advantage of introducing naked nucleic acid sequences into target cells is the transitory nature of the polynucleotide synthesis in the cells. Studies have shown that non-replicating DNA sequences can be introduced into cells to provide production of the desired polypeptide for periods of up to six months.

[0442] The polynucleotide construct can be delivered to the interstitial space of tissues within the an animal, including of muscle, skin, brain, lung, liver, spleen, bone marrow, thymus, heart, lymph, blood, bone, cartilage, pancreas, kidney, gall bladder, stomach, intestine, testis, ovary, uterus, rectum, nervous system, eye, gland, and

connective tissue. Interstitial space of the tissues comprises the intercellular, fluid, mucopolysaccharide matrix among the reticular fibers of organ tissues, elastic fibers in the walls of vessels or chambers, collagen fibers of fibrous tissues, or that same matrix within connective tissue ensheathing muscle cells or in the lacunae of bone. It is similarly the space occupied by the plasma of the circulation and the lymph fluid of the lymphatic channels. Delivery to the interstitial space of muscle tissue is preferred for the reasons discussed below. They may be conveniently delivered by injection into the tissues comprising these cells. They are preferably delivered to and expressed in persistent, non-dividing cells which are differentiated, although delivery and expression may be achieved in non-differentiated or less completely differentiated cells, such as, for example, stem cells of blood or skin fibroblasts. *In vivo* muscle cells are particularly competent in their ability to take up and express polynucleotides.

[0443] For the naked nucleic acid sequence injection, an effective dosage amount of DNA or RNA will be in the range of from about 0.05 mg/kg body weight to about 50 mg/kg body weight. Preferably the dosage will be from about 0.005 mg/kg to about 20 mg/kg and more preferably from about 0.05 mg/kg to about 5 mg/kg. Of course, as the artisan of ordinary skill will appreciate, this dosage will vary according to the tissue site of injection. The appropriate and effective dosage of nucleic acid sequence can readily be determined by those of ordinary skill in the art and may depend on the condition being treated and the route of administration.

[0444] The preferred route of administration is by the parenteral route of injection into the interstitial space of tissues. However, other parenteral routes may also be used, such as, inhalation of an aerosol formulation particularly for delivery to lungs or bronchial tissues, throat or mucous membranes of the nose. In addition, naked DNA constructs can be delivered to arteries during angioplasty by the catheter used in the procedure.

[0445] The naked polynucleotides are delivered by any method known in the art, including, but not limited to, direct needle injection at the delivery site, intravenous injection, topical administration, catheter infusion, and so-called "gene guns". These delivery methods are known in the art.

[0446] The constructs may also be delivered with delivery vehicles such as viral sequences, viral particles, liposome formulations, lipofectin, precipitating agents, etc. Such methods of delivery are known in the art.

[0447] In certain embodiments, the polynucleotide constructs are complexed in a liposome preparation. Liposomal preparations for use in the instant invention include cationic (positively charged), anionic (negatively charged) and neutral preparations. However, cationic liposomes are particularly preferred because a tight charge complex can be formed between the cationic liposome and the polyanionic nucleic acid. Cationic liposomes have been shown to mediate intracellular delivery of plasmid DNA (Felgner et al., Proc. Natl. Acad. Sci. USA (1987) 84:7413-7416, which is herein incorporated by reference); mRNA (Malone et al., Proc. Natl. Acad. Sci. USA (1989) 86:6077-6081, which is herein incorporated by reference); and purified transcription factors (Debs et al., J. Biol. Chem. (1990) 265:10189-10192, which is herein incorporated by reference), in functional form.

[0448] Cationic liposomes are readily available. For example, N[1-2,3-dioleoyloxy)propyl]-N,N,N-triethylammonium (DOTMA) liposomes are particularly useful and are available under the trademark Lipofectin, from GIBCO BRL, Grand Island, N.Y., (see, also, Felgner et al., Proc. Natl. Acad. Sci. USA (1987) 84:7413-7416, which is herein incorporated by reference). Other commercially available liposomes include transfectace (DDAB/DOPE) and DOTAP/DOPE (Boehringer).

[0449] Other cationic liposomes can be prepared from readily available materials using techniques well known in the art. See, e.g. PCT Publication No. WO 90/11092 (which is herein incorporated by reference) for a description of the synthesis of DOTAP (1,2-bis(oleoyloxy)-3-(trimethylammonio)propane) liposomes. Preparation of DOTMA liposomes is explained in the literature, see, e.g., P. Felgner et al., Proc. Natl. Acad. Sci. USA 84:7413-7417, which is herein incorporated by reference. Similar methods can be used to prepare liposomes from other cationic lipid materials.

[0450] Similarly, anionic and neutral liposomes are readily available, such as from Avanti Polar Lipids (Birmingham, Ala.), or can be easily prepared using readily available materials. Such materials include phosphatidyl choline, cholesterol, phosphatidyl ethanolamine, dioleoylphosphatidyl choline (DOPC),

dioleoylphosphatidyl glycerol (DOPG), dioleoylphosphatidyl ethanolamine (DOPE), among others. These materials can also be mixed with the DOTMA and DOTAP starting materials in appropriate ratios. Methods for making liposomes using these materials are well known in the art.

[0451] For example, commercially dioleoylphosphatidyl choline (DOPC), dioleoylphosphatidyl glycerol (DOPG), and dioleoylphosphatidyl ethanolamine (DOPE) can be used in various combinations to make conventional liposomes, with or without the addition of cholesterol. Thus, for example, DOPG/DOPC vesicles can be prepared by drying 50 mg each of DOPG and DOPC under a stream of nitrogen gas into a sonication vial. The sample is placed under a vacuum pump overnight and is hydrated the following day with deionized water. The sample is then sonicated for 2 hours in a capped vial, using a Heat Systems model 350 sonicator equipped with an inverted cup (bath type) probe at the maximum setting while the bath is circulated at 15EC. Alternatively, negatively charged vesicles can be prepared without sonication to produce multilamellar vesicles or by extrusion through nucleopore membranes to produce unilamellar vesicles of discrete size. Other methods are known and available to those of skill in the art.

[0452] The liposomes can comprise multilamellar vesicles (MLVs), small unilamellar vesicles (SUVs), or large unilamellar vesicles (LUVs), with SUVs being preferred. The various liposome-nucleic acid complexes are prepared using methods well known in the art. See, e.g., Straubinger et al., *Methods of Immunology* (1983), 101:512-527, which is herein incorporated by reference. For example, MLVs containing nucleic acid can be prepared by depositing a thin film of phospholipid on the walls of a glass tube and subsequently hydrating with a solution of the material to be encapsulated. SUVs are prepared by extended sonication of MLVs to produce a homogeneous population of unilamellar liposomes. The material to be entrapped is added to a suspension of preformed MLVs and then sonicated. When using liposomes containing cationic lipids, the dried lipid film is resuspended in an appropriate solution such as sterile water or an isotonic buffer solution such as 10 mM Tris/NaCl, sonicated, and then the preformed liposomes are mixed directly with the DNA. The liposome and DNA form a very stable complex due to binding of the positively charged liposomes to the cationic DNA. SUVs find use with small nucleic acid

fragments. LUVs are prepared by a number of methods, well known in the art. Commonly used methods include Ca^{2+} -EDTA chelation (Papahadjopoulos et al., Biochim. Biophys. Acta (1975) 394:483; Wilson et al., Cell 17:77 (1979); ether injection (Deamer, D. and Bangham, A., Biochim. Biophys. Acta 443:629 (1976); Ostro et al., Biochem. Biophys. Res. Commun. 76:836 (1977); Fraley et al., Proc. Natl. Acad. Sci. USA 76:3348 (1979)); detergent dialysis (Enoch, H. and Strittmatter, P., Proc. Natl. Acad. Sci. USA 76:145 (1979)); and reverse-phase evaporation (REV) (Fraley et al., J. Biol. Chem. 255:10431 (1980); Szoka et al., Proc. Natl. Acad. Sci. USA 75:145 (1978); Schaefer-Ridder et al., Science 215:166 (1982)), which are herein incorporated by reference.

[0453] Generally, the ratio of DNA to liposomes will be from about 10:1 to about 1:10. Preferably, the ration will be from about 5:1 to about 1:5. More preferably, the ration will be about 3:1 to about 1:3. Still more preferably, the ratio will be about 1:1.

[0454] U.S. Patent No. 5,676,954 (which is herein incorporated by reference) reports on the injection of genetic material, complexed with cationic liposomes carriers, into mice. U.S. Patent Nos. 4,897,355, 4,946,787, 5,049,386, 5,459,127, 5,589,466, 5,693,622, 5,580,859, 5,703,055, and international publication no. WO 94/9469 (which are herein incorporated by reference) provide cationic lipids for use in transfecting DNA into cells and mammals. U.S. Patent Nos. 5,589,466, 5,693,622, 5,580,859, 5,703,055, and International Publication No. WO 94/9469 provide methods for delivering DNA-cationic lipid complexes to mammals.

[0455] In certain embodiments, cells are engineered, *ex vivo* or *in vivo*, using a retroviral particle containing RNA which comprises a sequence encoding a polypeptide of the present invention. Retroviruses from which the retroviral plasmid vectors may be derived include, but are not limited to, Moloney Murine Leukemia Virus, spleen necrosis virus, Rous sarcoma Virus, Harvey Sarcoma Virus, avian leukosis virus, gibbon ape leukemia virus, human immunodeficiency virus, Myeloproliferative Sarcoma Virus, and mammary tumor virus.

[0456] The retroviral plasmid vector is employed to transduce packaging cell lines to form producer cell lines. Examples of packaging cells which may be transfected include, but are not limited to, the PE501, PA317, R-2, R-AM, PA12, T19-14X, VT-19-17-H2, RCRE, RCRIP, GP+E-86, GP+envAm12, and DAN cell lines as described

in Miller, Human Gene Therapy 1:5-14 (1990), which is incorporated herein by reference in its entirety. The vector may transduce the packaging cells through any means known in the art. Such means include, but are not limited to, electroporation, the use of liposomes, and CaPO_4 precipitation. In one alternative, the retroviral plasmid vector may be encapsulated into a liposome, or coupled to a lipid, and then administered to a host.

[0457] The producer cell line generates infectious retroviral vector particles which include polynucleotide encoding a polypeptide of the present invention. Such retroviral vector particles then may be employed, to transduce eukaryotic cells, either *in vitro* or *in vivo*. The transduced eukaryotic cells will express a polypeptide of the present invention.

[0458] In certain other embodiments, cells are engineered, *ex vivo* or *in vivo*, with polynucleotide contained in an adenovirus vector. Adenovirus can be manipulated such that it encodes and expresses a polypeptide of the present invention, and at the same time is inactivated in terms of its ability to replicate in a normal lytic viral life cycle. Adenovirus expression is achieved without integration of the viral DNA into the host cell chromosome, thereby alleviating concerns about insertional mutagenesis. Furthermore, adenoviruses have been used as live enteric vaccines for many years with an excellent safety profile (Schwartz, et al., Am. Rev. Respir. Dis. 109:233-238 (1974)). Finally, adenovirus mediated gene transfer has been demonstrated in a number of instances including transfer of alpha-1-antitrypsin and CFTR to the lungs of cotton rats (Rosenfeld et al., Science 252:431-434 (1991); Rosenfeld et al., Cell 68:143-155 (1991)). Furthermore, extensive studies to attempt to establish adenovirus as a causative agent in human cancer were uniformly negative (Green et al., Proc. Natl. Acad. Sci. USA 76:6606 (1979)).

[0459] Suitable adenoviral vectors useful in the present invention are described, for example, in Kozarsky and Wilson, Curr. Opin. Genet. Devel. 3:499-503 (1993); Rosenfeld et al., Cell 68:143-155 (1992); Engelhardt et al., Human Genet. Ther. 4:759-769 (1993); Yang et al., Nature Genet. 7:362-369 (1994); Wilson et al., Nature 365:691-692 (1993); and U.S. Patent No. 5,652,224, which are herein incorporated by reference. For example, the adenovirus vector Ad2 is useful and can be grown in human 293 cells. These cells contain the E1 region of adenovirus and constitutively

express Ela and Elb, which complement the defective adenoviruses by providing the products of the genes deleted from the vector. In addition to Ad2, other varieties of adenovirus (e.g., Ad3, Ad5, and Ad7) are also useful in the present invention.

[0460] Preferably, the adenoviruses used in the present invention are replication deficient. Replication deficient adenoviruses require the aid of a helper virus and/or packaging cell-line to form infectious particles. The resulting virus is capable of infecting cells and can express a polynucleotide of interest which is operably linked to a promoter, but cannot replicate in most cells. Replication deficient adenoviruses may be deleted in one or more of all or a portion of the following genes: E1a, E1b, E3, E4, E2a, or L1 through L5.

[0461] In certain other embodiments, the cells are engineered, *ex vivo* or *in vivo*, using an adeno-associated virus (AAV). AAVs are naturally occurring defective viruses that require helper viruses to produce infectious particles (Muzyczka, N., Curr. Topics in Microbiol. Immunol. 158:97 (1992)). It is also one of the few viruses that may integrate its DNA into non-dividing cells. Vectors containing as little as 300 base pairs of AAV can be packaged and can integrate, but space for exogenous DNA is limited to about 4.5 kb. Methods for producing and using such AAVs are known in the art. See, for example, U.S. Patent Nos. 5,139,941, 5,173,414, 5,354,678, 5,436,146, 5,474,935, 5,478,745, and 5,589,377.

[0462] For example, an appropriate AAV vector for use in the present invention will include all the sequences necessary for DNA replication, encapsidation, and host-cell integration. The polynucleotide construct is inserted into the AAV vector using standard cloning methods, such as those found in Sambrook et al., Molecular Cloning: A Laboratory Manual, Cold Spring Harbor Press (1989). The recombinant AAV vector is then transfected into packaging cells which are infected with a helper virus, using any standard technique, including lipofection, electroporation, calcium phosphate precipitation, etc. Appropriate helper viruses include adenoviruses, cytomegaloviruses, vaccinia viruses, or herpes viruses. Once the packaging cells are transfected and infected, they will produce infectious AAV viral particles which contain the polynucleotide construct. These viral particles are then used to transduce eukaryotic cells, either *ex vivo* or *in vivo*. The transduced cells will contain the

polynucleotide construct integrated into its genome, and will express a polypeptide of the invention.

[0463] Another method of gene therapy involves operably associating heterologous control regions and endogenous reproductive system related antigen polynucleotide sequences (e.g., encoding a reproductive system related antigen polypeptide of the present invention) via homologous recombination (see, e.g., U.S. Patent No. 5,641,670, issued June 24, 1997; International Publication No. WO 96/29411, published September 26, 1996; International Publication No. WO 94/12650, published August 4, 1994; Koller et al., Proc. Natl. Acad. Sci. USA 86:8932-8935 (1989); and Zijlstra et al., Nature 342:435-438 (1989), which are herein incorporated by reference. This method involves the activation of a gene which is present in the target cells, but which is not normally expressed in the cells, or is expressed at a lower level than desired.

[0464] Polynucleotide constructs are made, using standard techniques known in the art, which contain the promoter with targeting sequences flanking the promoter. Suitable promoters are described herein. The targeting sequence is sufficiently complementary to an endogenous sequence to permit homologous recombination of the promoter-targeting sequence with the endogenous sequence. The targeting sequence will be sufficiently near the 5' end of the desired endogenous polynucleotide sequence so the promoter will be operably linked to the endogenous sequence upon homologous recombination.

[0465] The promoter and the targeting sequences can be amplified using PCR. Preferably, the amplified promoter contains distinct restriction enzyme sites on the 5' and 3' ends. Preferably, the 3' end of the first targeting sequence contains the same restriction enzyme site as the 5' end of the amplified promoter and the 5' end of the second targeting sequence contains the same restriction site as the 3' end of the amplified promoter. The amplified promoter and targeting sequences are digested and ligated together.

[0466] The promoter-targeting sequence construct is delivered to the cells, either as naked polynucleotide, or in conjunction with transfection-facilitating agents, such as liposomes, viral sequences, viral particles, whole viruses, lipofection, precipitating agents, etc., described in more detail above. The P promoter-targeting sequence can

be delivered by any method, included direct needle injection, intravenous injection, topical administration, catheter infusion, particle accelerators, etc. The methods are described in more detail below.

[0467] The promoter-targeting sequence construct is taken up by cells. Homologous recombination between the construct and the endogenous sequence takes place, such that an endogenous sequence is placed under the control of the promoter. The promoter then drives the expression of the endogenous sequence.

[0468] The polynucleotide encoding a polypeptide of the present invention may contain a secretory signal sequence that facilitates secretion of the protein. Typically, the signal sequence is positioned in the coding region of the polynucleotide to be expressed towards or at the 5' end of the coding region. The signal sequence may be homologous or heterologous to the reproductive system related antigen polynucleotide of interest and may be homologous or heterologous to the cells to be transfected. Additionally, the signal sequence may be chemically synthesized using methods known in the art.

[0469] Any mode of administration of any of the above-described polynucleotides constructs can be used so long as the mode results in the expression of one or more molecules in an amount sufficient to provide a therapeutic effect. This includes direct needle injection, systemic injection, catheter infusion, biolistic injectors, particle accelerators (i.e., "gene guns"), gelfoam sponge depots, other commercially available depot materials, osmotic pumps (e.g., Alza minipumps), oral or suppositorial solid (tablet or pill) pharmaceutical formulations, and decanting or topical applications during surgery. For example, direct injection of naked calcium phosphate-precipitated plasmid into rat liver and rat spleen or a protein-coated plasmid into the portal vein has resulted in gene expression of the foreign gene in the rat livers (Kaneda et al., Science 243:375 (1989)).

[0470] A preferred method of local administration is by direct injection. Preferably, a recombinant molecule of the present invention complexed with a delivery vehicle is administered by direct injection into or locally within the area of arteries. Administration of a composition locally within the area of arteries refers to injecting the composition centimeters and preferably, millimeters within arteries.

[0471] Another method of local administration is to contact a polynucleotide construct of the present invention in or around a surgical wound. For example, a patient can undergo surgery and the polynucleotide construct can be coated on the surface of tissue inside the wound or the construct can be injected into areas of tissue inside the wound.

[0472] Therapeutic compositions useful in systemic administration, include recombinant molecules of the present invention complexed to a targeted delivery vehicle of the present invention. Suitable delivery vehicles for use with systemic administration comprise liposomes comprising ligands for targeting the vehicle to a particular site. In specific embodiments, suitable delivery vehicles for use with systemic administration comprise liposomes comprising polypeptides of the invention for targeting the vehicle to a particular site.

[0473] Preferred methods of systemic administration, include intravenous injection, aerosol, oral and percutaneous (topical) delivery. Intravenous injections can be performed using methods standard in the art. Aerosol delivery can also be performed using methods standard in the art (see, for example, Stribling et al., Proc. Natl. Acad. Sci. USA 189:11277-11281, 1992, which is incorporated herein by reference). Oral delivery can be performed by complexing a polynucleotide construct of the present invention to a carrier capable of withstanding degradation by digestive enzymes in the gut of an animal. Examples of such carriers, include plastic capsules or tablets, such as those known in the art. Topical delivery can be performed by mixing a polynucleotide construct of the present invention with a lipophilic reagent (e.g., DMSO) that is capable of passing into the skin.

[0474] Determining an effective amount of substance to be delivered can depend upon a number of factors including, for example, the chemical structure and biological activity of the substance, the age and weight of the animal, the precise condition requiring treatment and its severity, and the route of administration. The frequency of treatments depends upon a number of factors, such as the amount of polynucleotide constructs administered per dose, as well as the health and history of the subject. The precise amount, number of doses, and timing of doses will be determined by the attending physician or veterinarian.

[0475] Therapeutic compositions of the present invention can be administered to any animal, preferably to mammals and birds. Preferred mammals include humans, dogs, cats, mice, rats, rabbits sheep, cattle, horses and pigs, with humans being particularly preferred.

Biological Activities

[0476] Polynucleotides or polypeptides, or agonists or antagonists of the present invention, can be used in assays to test for one or more biological activities. If these polynucleotides or polypeptides, or agonists or antagonists of the present invention, do exhibit activity in a particular assay, it is likely that these molecules may be involved in the diseases associated with the biological activity. Thus, the polynucleotides and polypeptides, and agonists or antagonists could be used to treat, prevent diagnose and/or prognose the associated disease.

[0477] The reproductive system related antigen polynucleotides and polypeptides of the invention are predicted to have predominant expression in tissues of the reproductive system.

[0478] Thus, the reproductive system related antigens of the invention may be useful as therapeutic molecules. Each would be useful for diagnosis, detection, treatment and/or prevention of diseases or disorders of the reproductive system, including, for example, injury and trauma, infections, neoplastic disorders, congenital defects, and diseases or disorders which result in infertility, complications with pregnancy, labor, or parturition, postpartum difficulties, and/or as described below in the section entitled "Reproductive System Disorders".

[0479] In a preferred embodiment, polynucleotides of the invention (e.g., a nucleic acid sequence of SEQ ID NO:X or the complement thereof; or the cDNA sequence contained in Clone ID NO:Z, or fragments or variants thereof) and/or polypeptides of the invention (e.g., an amino acid sequence contained in SEQ ID NO:Y, an amino acid sequence encoded by SEQ ID NO:X, or the complement thereof, an amino acid sequence encoded by the cDNA sequence contained in Clone ID NO:Z and fragments or variants thereof as described herein) are useful for the diagnosis, detection, treatment, and/or prevention of diseases or disorders of the tissues/cells corresponding to the library source disclosed in column 7 of Table 1A expressing the

corresponding reproductive system related sequence disclosed in the same row of Table 1A.

[0480] Particularly, the reproductive system related antigens may be a useful therapeutic for cancers of the reproductive system. Treatment, diagnosis, detection, and/or prevention of disorders of the reproductive system could be carried out using a reproductive system related antigen or soluble form of a reproductive system related antigen, a reproductive system related antigen ligand, gene therapy, or ex vivo applications. Moreover, inhibitors of a reproductive system related antigen, either blocking antibodies or mutant forms, could modulate the expression of the reproductive system related antigen. These inhibitors may be useful to treat, diagnose, detect, and/or prevent diseases associated with the misregulation of a reproductive system related antigen.

[0481] In one embodiment, the invention provides a method for the specific delivery of compositions of the invention to cells (e.g., normal or diseased reproductive system cells) by administering polypeptides of the invention (e.g., reproductive system related antigen polypeptides or anti-reproductive system related antigen antibodies) that are associated with heterologous polypeptides or nucleic acids. In one example, the invention provides a method for delivering a therapeutic protein into the targeted cell (e.g., an aberrant reproductive system cell or reproductive system cancer cell). In another example, the invention provides a method for delivering a single stranded nucleic acid (e.g., antisense or ribozymes) or double stranded nucleic acid (e.g., DNA that can integrate into the cell's genome or replicate episomally and that can be transcribed) into the targeted cell.

[0482] In another embodiment, the invention provides a method for the specific destruction of cells (e.g., the destruction of aberrant reproductive system cells, including, but not limited to, reproductive system tumor cells) by administering polypeptides of the invention (e.g., reproductive system related antigen polypeptides or fragments thereof, or anti-reproductive system related antigen antibodies) in association with toxins or cytotoxic prodrugs.

[0483] By "toxin" is meant compounds that bind and activate endogenous cytotoxic effector systems, radioisotopes, holotoxins, modified toxins, catalytic subunits of toxins, cytotoxins (cytotoxic agents), or any molecules or enzymes not

normally present in or on the surface of a cell that under defined conditions cause the cell's death. Toxins that may be used according to the methods of the invention include, but are not limited to, radioisotopes known in the art, compounds such as, for example, antibodies (or complement fixing containing portions thereof) that bind an inherent or induced endogenous cytotoxic effector system, thymidine kinase, endonuclease, RNase, alpha toxin, ricin, abrin, *Pseudomonas* exotoxin A, diphtheria toxin, saporin, momordin, gelonin, pokeweed antiviral protein, alpha-sarcin and cholera toxin. "Toxin" also includes a cytostatic or cytotoxic agent, a therapeutic agent or a radioactive metal ion, e.g., alpha-emitters such as, for example, ^{213}Bi , or other radioisotopes such as, for example, ^{103}Pd , ^{133}Xe , ^{131}I , ^{68}Ge , ^{57}Co , ^{65}Zn , ^{85}Sr , ^{32}P , ^{35}S , ^{90}Y , ^{153}Sm , ^{153}Gd , ^{169}Yb , ^{51}Cr , ^{54}Mn , ^{75}Se , ^{113}Sn , $^{90}\text{Yttrium}$, ^{117}Tin , $^{186}\text{Rhenium}$, $^{166}\text{Holmium}$, and $^{188}\text{Rhenium}$; luminescent labels, such as luminol; and fluorescent labels, such as fluorescein and rhodamine, and biotin.

[0484] Techniques known in the art may be applied to label antibodies of the invention. Such techniques include, but are not limited to, the use of bifunctional conjugating agents (see e.g., U.S. Patent Nos. 5,756,065; 5,714,631; 5,696,239; 5,652,361; 5,505,931; 5,489,425; 5,435,990; 5,428,139; 5,342,604; 5,274,119; 4,994,560; and 5,808,003; the contents of each of which are hereby incorporated by reference in its entirety). A cytotoxin or cytotoxic agent includes any agent that is detrimental to cells. Examples include paclitaxol, cytochalasin B, gramicidin D, ethidium bromide, emetine, mitomycin, etoposide, tenoposide, vincristine, vinblastine, colchicin, doxorubicin, daunorubicin, dihydroxy anthracin dione, mitoxantrone, mithramycin, actinomycin D, 1-dehydrotestosterone, glucocorticoids, procaine, tetracaine, lidocaine, propranolol, and puromycin and analogs or homologs thereof. Therapeutic agents include, but are not limited to, antimetabolites (e.g., methotrexate, 6-mercaptopurine, 6-thioguanine, cytarabine, 5-fluorouracil decarbazine), alkylating agents (e.g., mechlorethamine, thioepa chlorambucil, melphalan, carmustine (BSNU) and lomustine (CCNU), cyclophosphamide, busulfan, dibromomannitol, streptozotocin, mitomycin C, and cis-dichlorodiamine platinum (II) (DDP) cisplatin), anthracyclines (e.g., daunorubicin (formerly daunomycin) and doxorubicin), antibiotics (e.g., dactinomycin (formerly actinomycin), bleomycin, mithramycin, and anthramycin (AMC)), and anti-mitotic agents (e.g., vincristine and vinblastine).

[0485] By "cytotoxic prodrug" is meant a non-toxic compound that is converted by an enzyme, normally present in the cell, into a cytotoxic compound. Cytotoxic prodrugs that may be used according to the methods of the invention include, but are not limited to, glutamyl derivatives of benzoic acid mustard alkylating agent, phosphate derivatives of etoposide or mitomycin C, cytosine arabinoside, daunorubisin, and phenoxyacetamide derivatives of doxorubicin.

[0486] It will be appreciated that conditions caused by a decrease in the standard or normal level of a reproductive system related antigen activity in an individual, particularly disorders of the reproductive system, can be treated by administration of a reproductive system related antigen polypeptide (e.g., such as, for example, the complete reproductive system related antigen polypeptide, the soluble form of the extracellular domain of a reproductive system related antigen polypeptide, or cells expressing the complete protein) or agonist. Thus, the invention also provides a method of treatment of an individual in need of an increased level of reproductive system related antigen activity comprising administering to such an individual a pharmaceutical composition comprising an amount of an isolated reproductive system related antigen polypeptide of the invention, or agonist thereof (e.g., an agonistic anti-reproductive system related antigen antibody), effective to increase the reproductive system related antigen activity level in such an individual.

[0487] It will also be appreciated that conditions caused by a increase in the standard or normal level of reproductive system related antigen activity in an individual, particularly disorders of the reproductive system, can be treated by administration of reproductive system related antigen polypeptides (e.g., such as, for example, the complete reproductive system related antigen polypeptide, the soluble form of the extracellular domain of a reproductive system related antigen polypeptide, or cells expressing the complete protein) or antagonist (e.g., an antagonistic reproductive system related antigen antibody). Thus, the invention also provides a method of treatment of an individual in need of an decreased level of reproductive system related antigen activity comprising administering to such an individual a pharmaceutical composition comprising an amount of an isolated reproductive system related antigen polypeptide of the invention, or antagonist thereof (e.g., an antagonistic

anti- reproductive system related antigen antibody), effective to decrease the reproductive system related antigen activity level in such an individual.

[0488] In certain embodiments, a polypeptide of the invention, or polynucleotides, antibodies, agonists, or antagonists corresponding to that polypeptide, may be used to diagnose and/or prognose diseases and/or disorders associated with the tissue(s) in which the polypeptide of the invention is expressed, including one, two, three, four, five, or more tissues disclosed in Table 1A, column 7 (Tissue Distribution Library Code).

[0489] More generally, polynucleotides, translation products and antibodies corresponding to this gene may be useful for the diagnosis, prognosis, prevention, and/or treatment of diseases and/or disorders associated with the following systems.

Reproductive System Disorders

[0490] The polynucleotides or polypeptides, or agonists or antagonists of the invention may be used for the diagnosis, treatment, or prevention of diseases and/or disorders of the reproductive system. Reproductive system disorders that can be treated by the compositions of the invention, include, but are not limited to, reproductive system injuries, infections, neoplastic disorders, congenital defects, and diseases or disorders which result in infertility, complications with pregnancy, labor, or parturition, and postpartum difficulties.

[0491] Reproductive system disorders and/or diseases include diseases and/or disorders of the testes, including, but not limited to, testicular atrophy, testicular feminization, cryptorchism (unilateral and bilateral), anorchia, ectopic testis, epididymitis and orchitis (typically resulting from infections such as, for example, gonorrhea, mumps, tuberculosis, and syphilis), testicular torsion, vasitis nodosa, germ cell tumors (e.g., seminomas, embryonal cell carcinomas, teratocarcinomas, choriocarcinomas, yolk sac tumors, and teratomas), stromal tumors (e.g., Leydig cell tumors), hydrocele, hematocele, varicocele, spermatocele, inguinal hernia, and disorders of sperm production (e.g., immotile cilia syndrome, aspermia, asthenozoospermia, azoospermia, oligospermia, and teratozoospermia).

[0492] Reproductive system disorders also include, but are not limited to, disorders of the prostate gland, such as acute non-bacterial prostatitis, chronic non-bacterial prostatitis, acute bacterial prostatitis, chronic bacterial prostatitis, prostatodystonia, prostatosis, granulomatous prostatitis, malacoplakia, benign prostatic hypertrophy or hyperplasia, and prostate neoplastic disorders, including adenocarcinomas, transitional cell carcinomas, ductal carcinomas, and squamous cell carcinomas.

[0493] Additionally, the compositions of the invention may be useful in the diagnosis, treatment, and/or prevention of disorders or diseases of the penis and urethra, including, but not limited to, inflammatory disorders, such as balanoposthitis, balanitis xerotica obliterans, phimosis, paraphimosis, syphilis, herpes simplex virus, gonorrhea, non-gonococcal urethritis, chlamydia, mycoplasma, trichomonas, HIV, AIDS, Reiter's syndrome, condyloma acuminatum, condyloma latum, and pearly penile papules; urethral abnormalities, such as hypospadias, epispadias, and phimosis; premalignant lesions, including Erythroplasia of Queyrat, Bowen's disease, Bowenoid papulosis, giant condyloma of Buscke-Lowenstein, and verrucous carcinoma; penile cancers, including squamous cell carcinomas, carcinoma in situ, verrucous carcinoma, and disseminated penile carcinoma; urethral neoplastic disorders, including penile urethral carcinoma, bulbomembranous urethral carcinoma, and prostatic urethral carcinoma; and erectile disorders, such as priapism, Peyronie's disease, erectile dysfunction, and impotence.

[0494] Moreover, diseases and/or disorders of the vas deferens include, but are not limited to, vasculitis and CBAVD (congenital bilateral absence of the vas deferens); additionally, the polynucleotides, polypeptides, and agonists or antagonists of the present invention may be used in the diagnosis, treatment, and/or prevention of diseases and/or disorders of the seminal vesicles, including but not limited to, hydatid disease, congenital chloride diarrhea, and polycystic kidney disease.

[0495] Other disorders and/or diseases of the male reproductive system that may be diagnosed, treated, and/or prevented with the compositions of the invention include, but are not limited to, Klinefelter's syndrome, Young's syndrome, premature ejaculation, diabetes mellitus, cystic fibrosis, Kartagener's syndrome, high fever, multiple sclerosis, and gynecomastia.

[0496] Further, the polynucleotides, polypeptides, and agonists or antagonists of the present invention may be used in the diagnosis, treatment, and/or prevention of diseases and/or disorders of the vagina and vulva, including, but not limited to, bacterial vaginosis, candida vaginitis, herpes simplex virus, chancroid, granuloma inguinale, lymphogranuloma venereum, scabies, human papillomavirus, vaginal trauma, vulvar trauma, adenositis, chlamydia vaginitis, gonorrhea, trichomonas vaginitis, condyloma acuminatum, syphilis, molluscum contagiosum, atrophic vaginitis, Paget's disease, lichen sclerosus, lichen planus, vulvodynia, toxic shock syndrome, vaginismus, vulvovaginitis, vulvar vestibulitis, and neoplastic disorders, such as squamous cell hyperplasia, clear cell carcinoma, basal cell carcinoma, melanomas, cancer of Bartholin's gland, and vulvar intraepithelial neoplasia.

[0497] Disorders and/or diseases of the uterus that may be diagnosed, treated, and/or prevented with the compositions of the invention include, but are not limited to, dysmenorrhea, retroverted uterus, endometriosis, fibroids, adenomyosis, anovulatory bleeding, amenorrhea, Cushing's syndrome, hydatidiform moles, Asherman's syndrome, premature menopause, precocious puberty, uterine polyps, dysfunctional uterine bleeding (e.g., due to aberrant hormonal signals), and neoplastic disorders, such as adenocarcinomas, leiomyosarcomas, and sarcomas. Additionally, the polypeptides, polynucleotides, or agonists or antagonists of the invention may be useful as a marker or detector of, as well as in the diagnosis, treatment, and/or prevention of congenital uterine abnormalities, such as bicornuate uterus, septate uterus, simple unicornuate uterus, unicornuate uterus with a noncavitary rudimentary horn, unicornuate uterus with a non-communicating cavitary rudimentary horn, unicornuate uterus with a communicating cavitary horn, arcuate uterus, uterine didelphys, and T-shaped uterus.

[0498] Ovarian diseases and/or disorders that may be diagnosed, treated, and/or prevented with the compositions of the invention include, but are not limited to, anovulation, polycystic ovary syndrome (Stein-Leventhal syndrome), ovarian cysts, ovarian hypofunction, ovarian insensitivity to gonadotropins, ovarian overproduction of androgens, right ovarian vein syndrome, amenorrhea, hirsutism, and ovarian cancer (including, but not limited to, primary and secondary cancerous growth, Sertoli-Leydig tumors, endometrioid carcinoma of the ovary, ovarian papillary serous

adenocarcinoma, ovarian mucinous adenocarcinoma, and Ovarian Krukenberg tumors).

[0499] Cervical diseases and/or disorders that may be diagnosed, treated, and/or prevented with the compositions of the invention include, but are not limited to, cervicitis, chronic cervicitis, mucopurulent cervicitis, cervical dysplasia, cervical polyps, Nabothian cysts, cervical erosion, cervical incompetence, and cervical neoplasms (including, for example, cervical carcinoma, squamous metaplasia, squamous cell carcinoma, adenosquamous cell neoplasia, and columnar cell neoplasia).

[0500] Additionally, diseases and/or disorders of the reproductive system that may be diagnosed, treated, and/or prevented with the compositions of the invention include, but are not limited to, disorders and/or diseases of pregnancy, including miscarriage and stillbirth, such as early abortion, late abortion, spontaneous abortion, induced abortion, therapeutic abortion, threatened abortion, missed abortion, incomplete abortion, complete abortion, habitual abortion, missed abortion, and septic abortion; ectopic pregnancy, anemia, Rh incompatibility, vaginal bleeding during pregnancy, gestational diabetes, intrauterine growth retardation, polyhydramnios, HELLP syndrome, abruptio placentae, placenta previa, hyperemesis, preeclampsia, eclampsia, herpes gestationis, and urticaria of pregnancy. Additionally, the polynucleotides, polypeptides, and agonists or antagonists of the present invention may be used in the diagnosis, treatment, and/or prevention of diseases that can complicate pregnancy, including heart disease, heart failure, rheumatic heart disease, congenital heart disease, mitral valve prolapse, high blood pressure, anemia, kidney disease, infectious disease (e.g., rubella, cytomegalovirus, toxoplasmosis, infectious hepatitis, chlamydia, HIV, AIDS, and genital herpes), diabetes mellitus, Graves' disease, thyroiditis, hypothyroidism, Hashimoto's thyroiditis, chronic active hepatitis, cirrhosis of the liver, primary biliary cirrhosis, asthma, systemic lupus erythematosus, rheumatoid arthritis, myasthenia gravis, idiopathic thrombocytopenic purpura, appendicitis, ovarian cysts, gallbladder disorders, and obstruction of the intestine.

[0501] Complications associated with labor and parturition that may be diagnosed, treated, and/or prevented with the compositions of the invention include, but are not limited to, premature rupture of the membranes, pre-term labor, post-term pregnancy,

postmaturity, labor that progresses too slowly, fetal distress (e.g., abnormal heart rate (fetal or maternal), breathing problems, and abnormal fetal position), shoulder dystocia, prolapsed umbilical cord, amniotic fluid embolism, and aberrant uterine bleeding.

[0502] Further, diseases and/or disorders of the postdelivery period, that may be diagnosed, treated, and/or prevented with the compositions of the invention, include, but are not limited to, endometritis, myometritis, parametritis, peritonitis, pelvic thrombophlebitis, pulmonary embolism, endotoxemia, pyelonephritis, saphenous thrombophlebitis, mastitis, cystitis, postpartum hemorrhage, and inverted uterus.

[0503] Other disorders and/or diseases of the female reproductive system that may be diagnosed, treated, and/or prevented by the polynucleotides, polypeptides, and agonists or antagonists of the present invention include, but are not limited to, Turner's syndrome, pseudohermaphroditism, premenstrual syndrome, pelvic inflammatory disease, pelvic congestion (vascular engorgement), frigidity, anorgasmia, dyspareunia, ruptured fallopian tube, and Mittelschmerz.

Immune Activity

[0504] Polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention may be useful in treating, preventing, diagnosing and/or prognosing diseases, disorders, and/or conditions of the immune system, by, for example, activating or inhibiting the proliferation, differentiation, or mobilization (chemotaxis) of immune cells. Immune cells develop through a process called hematopoiesis, producing myeloid (platelets, red blood cells, neutrophils, and macrophages) and lymphoid (B and T lymphocytes) cells from pluripotent stem cells. The etiology of these immune diseases, disorders, and/or conditions may be genetic, somatic, such as cancer and some autoimmune diseases, acquired (e.g., by chemotherapy or toxins), or infectious. Moreover, polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention can be used as a marker or detector of a particular immune system disease or disorder.

[0505] In another embodiment, a polypeptide of the invention, or polynucleotides, antibodies, agonists, or antagonists corresponding to that polypeptide, may be used to treat diseases and disorders of the immune system and/or to inhibit or enhance an

immune response generated by cells associated with the tissue(s) in which the polypeptide of the invention is expressed, including one, two, three, four, five, or more tissues disclosed in Table 1A, column 7 (Tissue Distribution Library Code).

[0506] Polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention may be useful in treating, preventing, diagnosing, and/or prognosing immunodeficiencies, including both congenital and acquired immunodeficiencies. Examples of B cell immunodeficiencies in which immunoglobulin levels B cell function and/or B cell numbers are decreased include: X-linked agammaglobulinemia (Bruton's disease), X-linked infantile agammaglobulinemia, X-linked immunodeficiency with hyper IgM, non X-linked immunodeficiency with hyper IgM, X-linked lymphoproliferative syndrome (XLP), agammaglobulinemia including congenital and acquired agammaglobulinemia, adult onset agammaglobulinemia, late-onset agammaglobulinemia, dysgammaglobulinemia, hypogammaglobulinemia, unspecified hypogammaglobulinemia, recessive agammaglobulinemia (Swiss type), Selective IgM deficiency, selective IgA deficiency, selective IgG subclass deficiencies, IgG subclass deficiency (with or without IgA deficiency), Ig deficiency with increased IgM, IgG and IgA deficiency with increased IgM, antibody deficiency with normal or elevated Igs, Ig heavy chain deletions, kappa chain deficiency, B cell lymphoproliferative disorder (BLPD), common variable immunodeficiency (CVID), common variable immunodeficiency (CVI) (acquired), and transient hypogammaglobulinemia of infancy.

[0507] In specific embodiments, ataxia-telangiectasia or conditions associated with ataxia-telangiectasia are treated, prevented, diagnosed, and/or prognosing using the polypeptides or polynucleotides of the invention, and/or agonists or antagonists thereof.

[0508] Examples of congenital immunodeficiencies in which T cell and/or B cell function and/or number is decreased include, but are not limited to: DiGeorge anomaly, severe combined immunodeficiencies (SCID) (including, but not limited to, X-linked SCID, autosomal recessive SCID, adenosine deaminase deficiency, purine nucleoside phosphorylase (PNP) deficiency, Class II MHC deficiency (Bare lymphocyte syndrome), Wiskott-Aldrich syndrome, and ataxia telangiectasia), thymic hypoplasia, third and fourth pharyngeal pouch syndrome, 22q11.2 deletion, chronic

mucocutaneous candidiasis, natural killer cell deficiency (NK), idiopathic CD4+ T-lymphocytopenia, immunodeficiency with predominant T cell defect (unspecified), and unspecified immunodeficiency of cell mediated immunity.

[0509] In specific embodiments, DiGeorge anomaly or conditions associated with DiGeorge anomaly are treated, prevented, diagnosed, and/or prognosed using polypeptides or polynucleotides of the invention, or antagonists or agonists thereof.

[0510] Other immunodeficiencies that may be treated, prevented, diagnosed, and/or prognosed using polypeptides or polynucleotides of the invention, and/or agonists or antagonists thereof, include, but are not limited to, chronic granulomatous disease, Chédiak-Higashi syndrome, myeloperoxidase deficiency, leukocyte glucose-6-phosphate dehydrogenase deficiency, X-linked lymphoproliferative syndrome (XLP), leukocyte adhesion deficiency, complement component deficiencies (including C1, C2, C3, C4, C5, C6, C7, C8 and/or C9 deficiencies), reticular dysgenesis, thymic aplasia-aplasia, immunodeficiency with thymoma, severe congenital leukopenia, dysplasia with immunodeficiency, neonatal neutropenia, short limbed dwarfism, and Nezelof syndrome-combined immunodeficiency with Igs.

[0511] In a preferred embodiment, the immunodeficiencies and/or conditions associated with the immunodeficiencies recited above are treated, prevented, diagnosed and/or prognosed using polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention.

[0512] In a preferred embodiment polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention could be used as an agent to boost immunoresponsiveness among immunodeficient individuals. In specific embodiments, polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention could be used as an agent to boost immunoresponsiveness among B cell and/or T cell immunodeficient individuals.

[0513] The polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention may be useful in treating, preventing, diagnosing and/or prognosing autoimmune disorders. Many autoimmune disorders result from inappropriate recognition of self as foreign material by immune cells. This inappropriate recognition results in an immune response leading to the destruction of the host tissue. Therefore, the administration of polynucleotides and polypeptides of

the invention that can inhibit an immune response, particularly the proliferation, differentiation, or chemotaxis of T-cells, may be an effective therapy in preventing autoimmune disorders.

[0514] Autoimmune diseases or disorders that may be treated, prevented, diagnosed and/or prognosed by polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention include, but are not limited to, one or more of the following: systemic lupus erythematosus, rheumatoid arthritis, ankylosing spondylitis, multiple sclerosis, autoimmune thyroiditis, Hashimoto's thyroiditis, autoimmune hemolytic anemia, hemolytic anemia, thrombocytopenia, autoimmune thrombocytopenia purpura, autoimmune neonatal thrombocytopenia, idiopathic thrombocytopenia purpura, purpura (e.g., Henoch-Schoenlein purpura), autoimmune hemolytic anemia, Goodpasture's syndrome, Pemphigus vulgaris, myasthenia gravis, Grave's disease (hyperthyroidism), and insulin-resistant diabetes mellitus.

[0515] Additional disorders that are likely to have an autoimmune component that may be treated, prevented, and/or diagnosed with the compositions of the invention include, but are not limited to, type II collagen-induced arthritis, antiphospholipid syndrome, dermatitis, allergic encephalomyelitis, myocarditis, relapsing polychondritis, rheumatic heart disease, neuritis, uveitis ophthalmia, polyendocrinopathies, Reiter's Disease, Stiff-Man Syndrome, autoimmune pulmonary inflammation, autism, Guillain-Barre Syndrome, insulin dependent diabetes mellitus, and autoimmune inflammatory eye disorders.

[0516] Additional disorders that are likely to have an autoimmune component that may be treated, prevented, diagnosed and/or prognosed with the compositions of the invention include, but are not limited to, scleroderma with anti-collagen antibodies (often characterized, e.g., by nucleolar and other nuclear antibodies), mixed connective tissue disease (often characterized, e.g., by antibodies to extractable nuclear antigens (e.g., ribonucleoprotein)), polymyositis (often characterized, e.g., by nonhistone ANA), pernicious anemia (often characterized, e.g., by antiparietal cell, microsomes, and intrinsic factor antibodies), idiopathic Addison's disease (often characterized, e.g., by humoral and cell-mediated adrenal cytotoxicity, infertility (often characterized, e.g., by antispermatozoal antibodies), glomerulonephritis (often characterized, e.g., by glomerular basement membrane antibodies or immune complexes), bullous

pemphigoid (often characterized, e.g., by IgG and complement in basement membrane), Sjogren's syndrome (often characterized, e.g., by multiple tissue antibodies, and/or a specific nonhistone ANA (SS-B)), diabetes mellitus (often characterized, e.g., by cell-mediated and humoral islet cell antibodies), and adrenergic drug resistance (including adrenergic drug resistance with asthma or cystic fibrosis) (often characterized, e.g., by beta-adrenergic receptor antibodies).

[0517] Additional disorders that may have an autoimmune component that may be treated, prevented, diagnosed and/or prognosed with the compositions of the invention include, but are not limited to, chronic active hepatitis (often characterized, e.g., by smooth muscle antibodies), primary biliary cirrhosis (often characterized, e.g., by mitochondria antibodies), other endocrine gland failure (often characterized, e.g., by specific tissue antibodies in some cases), vitiligo (often characterized, e.g., by melanocyte antibodies), vasculitis (often characterized, e.g., by Ig and complement in vessel walls and/or low serum complement), post-MI (often characterized, e.g., by myocardial antibodies), cardiomyopathy syndrome (often characterized, e.g., by myocardial antibodies), urticaria (often characterized, e.g., by IgG and IgM antibodies to IgE), atopic dermatitis (often characterized, e.g., by IgG and IgM antibodies to IgE), asthma (often characterized, e.g., by IgG and IgM antibodies to IgE), and many other inflammatory, granulomatous, degenerative, and atrophic disorders.

[0518] In a preferred embodiment, the autoimmune diseases and disorders and/or conditions associated with the diseases and disorders recited above are treated, prevented, diagnosed and/or prognosed using for example, antagonists or agonists, polypeptides or polynucleotides, or antibodies of the present invention. In a specific preferred embodiment, rheumatoid arthritis is treated, prevented, and/or diagnosed using polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention.

[0519] In another specific preferred embodiment, systemic lupus erythematosus is treated, prevented, and/or diagnosed using polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention. In another specific preferred embodiment, idiopathic thrombocytopenia purpura is treated, prevented, and/or diagnosed using polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention.

- [0520] In another specific preferred embodiment IgA nephropathy is treated, prevented, and/or diagnosed using polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention.
- [0521] In a preferred embodiment, the autoimmune diseases and disorders and/or conditions associated with the diseases and disorders recited above are treated, prevented, diagnosed and/or prognosed using polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention.
- [0522] In preferred embodiments, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as a immunosuppressive agent(s).
- [0523] Polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention may be useful in treating, preventing, prognosing, and/or diagnosing diseases, disorders, and/or conditions of hematopoietic cells. Polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention could be used to increase differentiation and proliferation of hematopoietic cells, including the pluripotent stem cells, in an effort to treat or prevent those diseases, disorders, and/or conditions associated with a decrease in certain (or many) types hematopoietic cells, including but not limited to, leukopenia, neutropenia, anemia, and thrombocytopenia. Alternatively, Polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention could be used to increase differentiation and proliferation of hematopoietic cells, including the pluripotent stem cells, in an effort to treat or prevent those diseases, disorders, and/or conditions associated with an increase in certain (or many) types of hematopoietic cells, including but not limited to, histiocytosis.
- [0524] Allergic reactions and conditions, such as asthma (particularly allergic asthma) or other respiratory problems, may also be treated, prevented, diagnosed and/or prognosed using polypeptides, antibodies, or polynucleotides of the invention, and/or agonists or antagonists thereof. Moreover, these molecules can be used to treat, prevent, prognose, and/or diagnose anaphylaxis, hypersensitivity to an antigenic molecule, or blood group incompatibility.
- [0525] Additionally, polypeptides or polynucleotides of the invention, and/or agonists or antagonists thereof, may be used to treat, prevent, diagnose and/or

prognose IgE-mediated allergic reactions. Such allergic reactions include, but are not limited to, asthma, rhinitis, and eczema. In specific embodiments, polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention may be used to modulate IgE concentrations in vitro or in vivo.

[0526] Moreover, polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention have uses in the diagnosis, prognosis, prevention, and/or treatment of inflammatory conditions. For example, since polypeptides, antibodies, or polynucleotides of the invention, and/or agonists or antagonists of the invention may inhibit the activation, proliferation and/or differentiation of cells involved in an inflammatory response, these molecules can be used to prevent and/or treat chronic and acute inflammatory conditions. Such inflammatory conditions include, but are not limited to, for example, inflammation associated with infection (e.g., septic shock, sepsis, or systemic inflammatory response syndrome), ischemia-reperfusion injury, endotoxin lethality, complement-mediated hyperacute rejection, nephritis, cytokine or chemokine induced lung injury, inflammatory bowel disease, Crohn's disease, over production of cytokines (e.g., TNF or IL-1.), respiratory disorders (e.g., asthma and allergy); gastrointestinal disorders (e.g., inflammatory bowel disease); cancers (e.g., gastric, ovarian, lung, bladder, liver, and breast); CNS disorders (e.g., multiple sclerosis; ischemic brain injury and/or stroke, traumatic brain injury, neurodegenerative disorders (e.g., Parkinson's disease and Alzheimer's disease); AIDS-related dementia; and prion disease); cardiovascular disorders (e.g., atherosclerosis, myocarditis, cardiovascular disease, and cardiopulmonary bypass complications); as well as many additional diseases, conditions, and disorders that are characterized by inflammation (e.g., hepatitis, rheumatoid arthritis, gout, trauma, pancreatitis, sarcoidosis, dermatitis, renal ischemia-reperfusion injury, Grave's disease, systemic lupus erythematosus, diabetes mellitus, and allogenic transplant rejection).

[0527] Because inflammation is a fundamental defense mechanism, inflammatory disorders can effect virtually any tissue of the body. Accordingly, polynucleotides, polypeptides, and antibodies of the invention, as well as agonists or antagonists thereof, have uses in the treatment of tissue-specific inflammatory disorders, including, but not limited to, adrenalitis, alveolitis, angiocholecystitis, appendicitis,

balanitis, blepharitis, bronchitis, bursitis, carditis, cellulitis, cervicitis, cholecystitis, chondritis, cochitis, colitis, conjunctivitis, cystitis, dermatitis, diverticulitis, encephalitis, endocarditis, esophagitis, eustachitis, fibrositis, folliculitis, gastritis, gastroenteritis, gingivitis, glossitis, hepatosplenitis, keratitis, labyrinthitis, laryngitis, lymphangitis, mastitis, media otitis, meningitis, metritis, mucitis, myocarditis, myositis, myringitis, nephritis, neuritis, orchitis, osteochondritis, otitis, pericarditis, peritendonitis, peritonitis, pharyngitis, phlebitis, poliomyelitis, prostatitis, pulpitis, retinitis, rhinitis, salpingitis, scleritis, sclerochoroiditis, scrotitis, sinusitis, spondylitis, steatitis, stomatitis, synovitis, syringitis, tendonitis, tonsillitis, urethritis, and vaginitis.

[0528] In specific embodiments, polypeptides, antibodies, or polynucleotides of the invention, and/or agonists or antagonists thereof, are useful to diagnose, prognose, prevent, and/or treat organ transplant rejections and graft-versus-host disease. Organ rejection occurs by host immune cell destruction of the transplanted tissue through an immune response. Similarly, an immune response is also involved in GVHD, but, in this case, the foreign transplanted immune cells destroy the host tissues. Polypeptides, antibodies, or polynucleotides of the invention, and/or agonists or antagonists thereof, that inhibit an immune response, particularly the activation, proliferation, differentiation, or chemotaxis of T-cells, may be an effective therapy in preventing organ rejection or GVHD. In specific embodiments, polypeptides, antibodies, or polynucleotides of the invention, and/or agonists or antagonists thereof, that inhibit an immune response, particularly the activation, proliferation, differentiation, or chemotaxis of T-cells, may be an effective therapy in preventing experimental allergic and hyperacute xenograft rejection.

[0529] In other embodiments, polypeptides, antibodies, or polynucleotides of the invention, and/or agonists or antagonists thereof, are useful to diagnose, prognose, prevent, and/or treat immune complex diseases, including, but not limited to, serum sickness, post streptococcal glomerulonephritis, polyarteritis nodosa, and immune complex-induced vasculitis.

[0530] Polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the invention can be used to treat, detect, and/or prevent infectious agents. For example, by increasing the immune response, particularly increasing the proliferation activation and/or differentiation of B and/or T cells, infectious diseases may be treated,

detected, and/or prevented. The immune response may be increased by either enhancing an existing immune response, or by initiating a new immune response. Alternatively, polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention may also directly inhibit the infectious agent (refer to section of application listing infectious agents, etc), without necessarily eliciting an immune response.

[0531] In another embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as a vaccine adjuvant that enhances immune responsiveness to an antigen. In a specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as an adjuvant to enhance tumor-specific immune responses.

[0532] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as an adjuvant to enhance anti-viral immune responses. Anti-viral immune responses that may be enhanced using the compositions of the invention as an adjuvant, include virus and virus associated diseases or symptoms described herein or otherwise known in the art. In specific embodiments, the compositions of the invention are used as an adjuvant to enhance an immune response to a virus, disease, or symptom selected from the group consisting of: AIDS, meningitis, Dengue, EBV, and hepatitis (e.g., hepatitis B). In another specific embodiment, the compositions of the invention are used as an adjuvant to enhance an immune response to a virus, disease, or symptom selected from the group consisting of: HIV/AIDS, respiratory syncytial virus, Dengue, rotavirus, Japanese B encephalitis, influenza A and B, parainfluenza, measles, cytomegalovirus, rabies, Junin, Chikungunya, Rift Valley Fever, herpes simplex, and yellow fever.

[0533] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as an adjuvant to enhance anti-bacterial or anti-fungal immune responses. Anti-bacterial or anti-fungal immune responses that may be enhanced using the compositions of the invention as an adjuvant, include bacteria or fungus and bacteria or fungus associated diseases or symptoms described herein or otherwise known in the art. In specific embodiments, the compositions of the invention are used as an adjuvant to enhance an immune

response to a bacteria or fungus, disease, or symptom selected from the group consisting of: tetanus, Diphtheria, botulism, and meningitis type B.

[0534] In another specific embodiment, the compositions of the invention are used as an adjuvant to enhance an immune response to a bacteria or fungus, disease, or symptom selected from the group consisting of: *Vibrio cholerae*, *Mycobacterium leprae*, *Salmonella typhi*, *Salmonella paratyphi*, *Meisseria meningitidis*, *Streptococcus pneumoniae*, Group B streptococcus, *Shigella spp.*, Enterotoxigenic *Escherichia coli*, Enterohemorrhagic *E. coli*, and *Borrelia burgdorferi*.

[0535] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as an adjuvant to enhance anti-parasitic immune responses. Anti-parasitic immune responses that may be enhanced using the compositions of the invention as an adjuvant, include parasite and parasite associated diseases or symptoms described herein or otherwise known in the art. In specific embodiments, the compositions of the invention are used as an adjuvant to enhance an immune response to a parasite. In another specific embodiment, the compositions of the invention are used as an adjuvant to enhance an immune response to Plasmodium (malaria) or Leishmania.

[0536] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention may also be employed to treat infectious diseases including silicosis, sarcoidosis, and idiopathic pulmonary fibrosis; for example, by preventing the recruitment and activation of mononuclear phagocytes.

[0537] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as an antigen for the generation of antibodies to inhibit or enhance immune mediated responses against polypeptides of the invention.

[0538] In one embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are administered to an animal (e.g., mouse, rat, rabbit, hamster, guinea pig, pigs, micro-pig, chicken, camel, goat, horse, cow, sheep, dog, cat, non-human primate, and human, most preferably human) to boost the immune system to produce increased quantities of one or more antibodies (e.g., IgG, IgA, IgM, and IgE), to induce higher affinity antibody production and

immunoglobulin class switching (e.g., IgG, IgA, IgM, and IgE), and/or to increase an immune response.

[0539] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as a stimulator of B cell responsiveness to pathogens.

[0540] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as an activator of T cells.

[0541] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as an agent that elevates the immune status of an individual prior to their receipt of immunosuppressive therapies.

[0542] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as an agent to induce higher affinity antibodies.

[0543] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as an agent to increase serum immunoglobulin concentrations.

[0544] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as an agent to accelerate recovery of immunocompromised individuals.

[0545] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as an agent to boost immunoresponsiveness among aged populations and/or neonates.

[0546] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as an immune system enhancer prior to, during, or after bone marrow transplant and/or other transplants (e.g., allogeneic or xenogeneic organ transplantation). With respect to transplantation, compositions of the invention may be administered prior to, concomitant with, and/or after transplantation. In a specific embodiment, compositions of the invention are administered after transplantation, prior to the beginning of recovery of T-cell populations. In another specific embodiment, compositions of the invention are first

administered after transplantation after the beginning of recovery of T cell populations, but prior to full recovery of B cell populations.

[0547] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as an agent to boost immunoresponsiveness among individuals having an acquired loss of B cell function. Conditions resulting in an acquired loss of B cell function that may be ameliorated or treated by administering the polypeptides, antibodies, polynucleotides and/or agonists or antagonists thereof, include, but are not limited to, HIV Infection, AIDS, bone marrow transplant, and B cell chronic lymphocytic leukemia (CLL).

[0548] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as an agent to boost immunoresponsiveness among individuals having a temporary immune deficiency. Conditions resulting in a temporary immune deficiency that may be ameliorated or treated by administering the polypeptides, antibodies, polynucleotides and/or agonists or antagonists thereof, include, but are not limited to, recovery from viral infections (e.g., influenza), conditions associated with malnutrition, recovery from infectious mononucleosis, or conditions associated with stress, recovery from measles, recovery from blood transfusion, and recovery from surgery.

[0549] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as a regulator of antigen presentation by monocytes, dendritic cells, and/or B-cells. In one embodiment, polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention enhance antigen presentation or antagonizes antigen presentation in vitro or in vivo. Moreover, in related embodiments, said enhancement or antagonism of antigen presentation may be useful as an anti-tumor treatment or to modulate the immune system.

[0550] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as an agent to direct an individual's immune system towards development of a humoral response (i.e. TH2) as opposed to a TH1 cellular response.

[0551] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as a means to induce

tumor proliferation and thus make it more susceptible to anti-neoplastic agents. For example, multiple myeloma is a slowly dividing disease and is thus refractory to virtually all anti-neoplastic regimens. If these cells were forced to proliferate more rapidly their susceptibility profile would likely change.

[0552] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as a stimulator of B cell production in pathologies such as AIDS, chronic lymphocyte disorder and/or Common Variable Immunodeficiency.

[0553] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as a therapy for generation and/or regeneration of lymphoid tissues following surgery, trauma or genetic defect. In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used in the pretreatment of bone marrow samples prior to transplant.

[0554] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as a gene-based therapy for genetically inherited disorders resulting in immunoincompetence/immunodeficiency such as observed among SCID patients.

[0555] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as a means of activating monocytes/macrophages to defend against parasitic diseases that effect monocytes such as Leishmania.

[0556] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as a means of regulating secreted cytokines that are elicited by polypeptides of the invention.

[0557] In another embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used in one or more of the applications described herein, as they may apply to veterinary medicine.

[0558] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as a means of blocking various aspects of immune responses to foreign agents or self. Examples of diseases or conditions in which blocking of certain aspects of immune responses may be

desired include autoimmune disorders such as lupus, and arthritis, as well as immunoresponsiveness to skin allergies, inflammation, bowel disease, injury and diseases/disorders associated with pathogens.

[0559] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as a therapy for preventing the B cell proliferation and Ig secretion associated with autoimmune diseases such as idiopathic thrombocytopenic purpura, systemic lupus erythematosus and multiple sclerosis.

[0560] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as a inhibitor of B and/or T cell migration in endothelial cells. This activity disrupts tissue architecture or cognate responses and is useful, for example in disrupting immune responses, and blocking sepsis.

[0561] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as a therapy for chronic hypergammaglobulinemia evident in such diseases as monoclonal gammopathy of undetermined significance (MGUS), Waldenstrom's disease, related idiopathic monoclonal gammopathies, and plasmacytomas.

[0562] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention may be employed for instance to inhibit polypeptide chemotaxis and activation of macrophages and their precursors, and of neutrophils, basophils, B lymphocytes and some T-cell subsets, e.g., activated and CD8 cytotoxic T cells and natural killer cells, in certain autoimmune and chronic inflammatory and infective diseases. Examples of autoimmune diseases are described herein and include multiple sclerosis, and insulin-dependent diabetes.

[0563] The polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention may also be employed to treat idiopathic hyper-eosinophilic syndrome by, for example, preventing eosinophil production and migration.

[0564] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used to enhance or inhibit complement mediated cell lysis.

[0565] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used to enhance or inhibit antibody dependent cellular cytotoxicity.

[0566] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention may also be employed for treating atherosclerosis, for example, by preventing monocyte infiltration in the artery wall.

[0567] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention may be employed to treat adult respiratory distress syndrome (ARDS).

[0568] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention may be useful for stimulating wound and tissue repair, stimulating angiogenesis, and/or stimulating the repair of vascular or lymphatic diseases or disorders. Additionally, agonists and antagonists of the invention may be used to stimulate the regeneration of mucosal surfaces.

[0569] In a specific embodiment, polynucleotides or polypeptides, and/or agonists thereof are used to diagnose, prognose, treat, and/or prevent a disorder characterized by primary or acquired immunodeficiency, deficient serum immunoglobulin production, recurrent infections, and/or immune system dysfunction. Moreover, polynucleotides or polypeptides, and/or agonists thereof may be used to treat or prevent infections of the joints, bones, skin, and/or parotid glands, blood-borne infections (e.g., sepsis, meningitis, septic arthritis, and/or osteomyelitis), autoimmune diseases (e.g., those disclosed herein), inflammatory disorders, and malignancies, and/or any disease or disorder or condition associated with these infections, diseases, disorders and/or malignancies) including, but not limited to, CVID, other primary immune deficiencies, HIV disease, CLL, recurrent bronchitis, sinusitis, otitis media, conjunctivitis, pneumonia, hepatitis, meningitis, herpes zoster (e.g., severe herpes zoster), and/or pneumocystis carinii. Other diseases and disorders that may be prevented, diagnosed, prognosed, and/or treated with polynucleotides or polypeptides, and/or agonists of the present invention include, but are not limited to, HIV infection, HTLV-BLV infection, lymphopenia, phagocyte bactericidal dysfunction anemia, thrombocytopenia, and hemoglobinuria.

- [0570] In another embodiment, polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention are used to treat, and/or diagnose an individual having common variable immunodeficiency disease ("CVID"; also known as "acquired agammaglobulinemia" and "acquired hypogammaglobulinemia") or a subset of this disease.
- [0571] In a specific embodiment, polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention may be used to diagnose, prognose, prevent, and/or treat cancers or neoplasms including immune cell or immune tissue-related cancers or neoplasms. Examples of cancers or neoplasms that may be prevented, diagnosed, or treated by polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention include, but are not limited to, acute myelogenous leukemia, chronic myelogenous leukemia, Hodgkin's disease, non-Hodgkin's lymphoma, acute lymphocytic anemia (ALL) Chronic lymphocyte leukemia, plasmacytomas, multiple myeloma, Burkitt's lymphoma, EBV-transformed diseases, and/or diseases and disorders described in the section entitled "Hyperproliferative Disorders" elsewhere herein.
- [0572] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as a therapy for decreasing cellular proliferation of Large B-cell Lymphomas.
- [0573] In another specific embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are used as a means of decreasing the involvement of B cells and Ig associated with Chronic Myelogenous Leukemia.
- [0574] In specific embodiments, the compositions of the invention are used as an agent to boost immunoresponsiveness among B cell immunodeficient individuals, such as, for example, an individual who has undergone a partial or complete splenectomy.
- [0575] Antagonists of the invention include, for example, binding and/or inhibitory antibodies, antisense nucleic acids, ribozymes or soluble forms of the polypeptides of the present invention (e.g., Fc fusion protein; see, e.g., Example 9). Agonists of the invention include, for example, binding or stimulatory antibodies, and soluble forms of the polypeptides (e.g., Fc fusion proteins; see, e.g., Example 9).

Polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention may be employed in a composition with a pharmaceutically acceptable carrier, e.g., as described herein.

[0576] In another embodiment, polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention are administered to an animal (including, but not limited to, those listed above, and also including transgenic animals) incapable of producing functional endogenous antibody molecules or having an otherwise compromised endogenous immune system, but which is capable of producing human immunoglobulin molecules by means of a reconstituted or partially reconstituted immune system from another animal (see, e.g., published PCT Application Nos. WO98/24893, WO/9634096, WO/9633735, and WO/9110741). Administration of polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention to such animals is useful for the generation of monoclonal antibodies against the polypeptides, antibodies, polynucleotides and/or agonists or antagonists of the present invention.

Blood-Related Disorders

[0577] The polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention may be used to modulate hemostatic (the stopping of bleeding) or thrombolytic (clot dissolving) activity. For example, by increasing hemostatic or thrombolytic activity, polynucleotides or polypeptides, and/or agonists or antagonists of the present invention could be used to treat or prevent blood coagulation diseases, disorders, and/or conditions (e.g., afibrinogenemia, factor deficiencies, hemophilia), blood platelet diseases, disorders, and/or conditions (e.g., thrombocytopenia), or wounds resulting from trauma, surgery, or other causes. Alternatively, polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention that can decrease hemostatic or thrombolytic activity could be used to inhibit or dissolve clotting. These molecules could be important in the treatment or prevention of heart attacks (infarction), strokes, or scarring.

[0578] In specific embodiments, the polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention may be used to prevent, diagnose, prognose, and/or treat thrombosis, arterial thrombosis, venous thrombosis,

thromboembolism, pulmonary embolism, atherosclerosis, myocardial infarction, transient ischemic attack, unstable angina. In specific embodiments, the polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention may be used for the prevention of occlusion of saphenous grafts, for reducing the risk of periprocedural thrombosis as might accompany angioplasty procedures, for reducing the risk of stroke in patients with atrial fibrillation including nonrheumatic atrial fibrillation, for reducing the risk of embolism associated with mechanical heart valves and or mitral valves disease. Other uses for the polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention, include, but are not limited to, the prevention of occlusions in extracorporeal devices (e.g., intravascular canulas, vascular access shunts in hemodialysis patients, hemodialysis machines, and cardiopulmonary bypass machines).

[0579] In another embodiment, a polypeptide of the invention, or polynucleotides, antibodies, agonists, or antagonists corresponding to that polypeptide, may be used to prevent, diagnose, prognose, and/or treat diseases and disorders of the blood and/or blood forming organs associated with the tissue(s) in which the polypeptide of the invention is expressed, including one, two, three, four, five, or more tissues disclosed in Table 1A, column 7 (Tissue Distribution Library Code).

[0580] The polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention may be used to modulate hematopoietic activity (the formation of blood cells). For example, the polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention may be used to increase the quantity of all or subsets of blood cells, such as, for example, erythrocytes, lymphocytes (B or T cells), myeloid cells (e.g., basophils, eosinophils, neutrophils, mast cells, macrophages) and platelets. The ability to decrease the quantity of blood cells or subsets of blood cells may be useful in the prevention, detection, diagnosis and/or treatment of anemias and leukopenias described below. Alternatively, the polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention may be used to decrease the quantity of all or subsets of blood cells, such as, for example, erythrocytes, lymphocytes (B or T cells), myeloid cells (e.g., basophils, eosinophils, neutrophils, mast cells, macrophages) and platelets.. The ability to decrease the quantity of blood cells or subsets of blood cells

may be useful in the prevention, detection, diagnosis and/or treatment of leukocytoses, such as, for example eosinophilia.

[0581] The polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention may be used to prevent, treat, or diagnose blood dyscrasia.

[0582] Anemias are conditions in which the number of red blood cells or amount of hemoglobin (the protein that carries oxygen) in them is below normal. Anemia may be caused by excessive bleeding, decreased red blood cell production, or increased red blood cell destruction (hemolysis). The polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention may be useful in treating, preventing, and/or diagnosing anemias. Anemias that may be treated prevented or diagnosed by the polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention include iron deficiency anemia, hypochromic anemia, microcytic anemia, chlorosis, hereditary sideroblastic anemia, idiopathic acquired sideroblastic anemia, red cell aplasia, megaloblastic anemia (e.g., pernicious anemia, (vitamin B12 deficiency) and folic acid deficiency anemia), aplastic anemia, hemolytic anemias (e.g., autoimmune hemolytic anemia, microangiopathic hemolytic anemia, and paroxysmal nocturnal hemoglobinuria). The polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention may be useful in treating, preventing, and/or diagnosing anemias associated with diseases including but not limited to, anemias associated with systemic lupus erythematosus, cancers, lymphomas, chronic renal disease, and enlarged spleens. The polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention may be useful in treating, preventing, and/or diagnosing anemias arising from drug treatments such as anemias associated with methyldopa, dapsone, and/or sulfadruugs. Additionally, the polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention may be useful in treating, preventing, and/or diagnosing anemias associated with abnormal red blood cell architecture including but not limited to, hereditary spherocytosis, hereditary elliptocytosis, glucose-6-phosphate dehydrogenase deficiency, and sickle cell anemia.

[0583] The polynucleotides, polypeptides, antibodies, and/or agonists or antagonists of the present invention may be useful in treating, preventing, and/or